Arbitration CAS 2020/A/6807 Blake Leeper v. International Association of Athletics Federations (IAAF), award of 23 October 2020

Panel: Mr James Drake QC (United Kingdom), President; Mr Klaus Reichert SC (Ireland); Mr Murray Rosen QC (United Kingdom)

Athletics (sprint)
Eligibility
Interpretation of a rule
Burden of proving the lawfulness/unlawfulness of a rule – the justifications underpinning a discriminatory rule

1. **The approach to the proper construction of a rule is that panels should endeavour to discern its meaning by reference to the natural and ordinary meaning of the words used in the context and circumstances in which they are used. Additionally, a rule should be construed purposively, *i.e.* to give effect to its purpose (if readily identifiable). Moreover, if there is any doubt or ambiguity in the wording, a rule should be construed against its drafter. A rule is not interpreted in a way that gives rise to consequences which are absurd or unworkable. *In casu*, the question whether a particular disabled athlete will derive an *"overall competitive advantage"* through the use of a mechanical aid can only be answered by comparing (a) the performance that the athlete is actually capable of achieving while running with their disability and their mechanical aid; and (b) the performance they would hypothetically have been capable of achieving in the same event if they were running without that disability and without that aid.**

2. **The answer to the question of who bears the burden of proving the lawfulness/unlawfulness of a rule depends on whether or not said rule is discriminatory. A party seeking to challenge an allegedly discriminatory regulation bears the burden of establishing that said rule discriminates on the basis of a protected ground. If a rule did so discriminate, the burden of proof shifts to its author to establish that said rule is a necessary, reasonable, and proportionate means of attaining a legitimate objective. Although the provisions of a rule apply to all athletes (*in casu*, who wish to use mechanical aids during IAAF-sanctioned competitions), it can be indirectly discriminatory due to its specific objective and its practical effect. The conclusions on the aspects of necessity, reasonableness and proportionality of a rule as well as in connection with its legitimate objective are based on an in concreto analysis of the circumstances of a case and by having due regard to an international federation's margin of appreciation.**

I. PARTIES

1. The Appellant, Mr Blake Leeper, is an elite athlete. He is a bilateral transtibial amputee sprinter from the United States who specialises in the 400-metre event. Because both of his legs have been amputated, Mr Leeper uses passive-elastic carbon-fibre running-specific prostheses ("RSPs") to enable him to run[1].

2. The Respondent, the International Association of Athletics Federations (the "IAAF"), is the international governing body of the sport of athletics, recognised as such by the International Olympic Committee. It has its seat and headquarters in Monaco. The IAAF has recently renamed itself as "World Athletics" but for ease of comprehension the Respondent is referred to as the "IAAF" throughout this Award.

II. OVERVIEW OF THE CASE

3. As the international governing body of the sport of athletics, the IAAF has promulgated various rules and regulations governing (among other things) international track and field competitions. Those rules and regulations include the IAAF Competition Rules 2018-2019 (the "IAAF Competition Rules"). The relevant provisions of the IAAF Competition Rules have recently been re-enacted (in identical terms, but with different numbering) in the World Athletic Technical Rules (the "WA Technical Rules").

4. One such rule is Rule 144.3(d) of the IAAF Competition Rules, subsequently re-enacted in materially identical form in Rule 6.3.4 of the WA Technical Rules. This rule (referred to throughout this Award as the "Rule") is set out in full below. For present purposes, it is noted that the Rule seeks to preclude any athlete from receiving (or giving) *"assistance"* within the competition area and defines *"assistance"* to include *"The use of any mechanical aid, unless the athlete can establish on the balance of probabilities that the use of an aid would not provide him with an overall competitive advantage over an athlete not using such aid"*.

5. By letter dated 3 July 2019, Mr Leeper applied to the IAAF for *"a ruling that the prosthetics that Mr Leeper currently uses, and plans to continue using, in competition in pursuit of his qualification for the 2020 Olympic Games are allowable under IAAF Rule 144.3(d)"* (the "Application"). The Application was made by Mr Leeper in respect of the use by him of his particular RSPs[2] and for, in particular, the 400m event.

6. On 18 February 2020, the IAAF denied the Application on the basis that, pursuant to the Rule, Mr Leeper had *"not met his burden of proof to show on the balance of probabilities that his use of prostheses would not provide him with an overall competitive advantage over an athlete not using such prostheses"* (per the letter of that date to Mr Leeper from the IAAF Chief Executive Officer, Mr Jon Ridgeon) (the "Decision").

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1 For the sake of clarity, the Panel notes the following: (a) the word 'prosthetics' means the technical and medical process of creating artificial limbs and fitting them on individuals who have undergone amputation surgery; and (b) the artificial parts themselves are called prostheses (singular, prosthesis).

2 The RSPs in question are J-shaped carbon fibre category 3 Ottobock 1E90 Sprinter RSPs.

7. It is from the Decision that Mr Leeper now appeals to the Court of Arbitration for Sport ("CAS").

8. This appeal concerns two related sets of issues. The first set concerns the meaning of the Rule and the validity of the provision within the Rule that places the burden of proof on the athlete who wishes to use a mechanical aid. The second concerns the application of the Rule in respect of Mr Leeper's use of his particular RSPs in a particular event (the 400m event). It is important to understand these specifics: this appeal is *not* about the broader question of whether or not disabled athletes should be permitted to compete against able-bodied athletes in elite level international athletics competitions, and if so on what terms.

III. FACTUAL BACKGROUND

9. The Parties adduced extensive evidence and submissions in support of their respective positions in this appeal. Below is a summary of the relevant facts and allegations based on the parties' written submissions, pleadings and evidence adduced at the hearing before the Panel on 13 and 15 July 2020. While the Panel has considered all the facts, allegations, legal arguments and evidence submitted by the parties in the present proceedings, it refers in its Award only to the submissions and evidence it considers necessary to explain its reasoning.

10. In 2009, Mr Leeper began competing in official para-athletics events.

11. In 2012, after qualifying for the US Paralympic team, Mr Leeper competed in the London Paralympics, where he won the silver and bronze medal in the 400m and 200m events, respectively. The following year he won silver medals in the 100m, 200m and 400m events and was a member of the gold medal winning 4x100m relay team at the International Paralympic Committee ("IPC") World Championships.

12. In June 2017, Mr Leeper broke the 400m Paralympic world record, running a time of 45.25 seconds at the USA Track & Field ("USATF") Outdoor Championships.

13. As from June 2017, Mr Leeper began competing against able-bodied athletes in the 400m event at competitions organised by the IAAF's member federations. In April and May 2018, Mr Leeper competed against able-bodied athletes at several other international athletics competitions. He ran the 400m event in times of 45.07 seconds, 45.21 seconds and 45.37 at those competitions. On 4 June 2018, Mr Leeper participated at an IAAF-approved track event in Prague, Czech Republic. He completed the 400m event in a time of 44.42 seconds. This was 0.48 seconds faster than the qualifying time set by the IAAF for the 2020 Olympic Games (which have since been postponed until 2021 as a result of the COVID-19 pandemic).

14. On 19 June 2018, Mr Duffy Mahoney, Chief of Sport Performance at USATF, sent an email to Mr Leeper which stated that:

> *"Recently, we received notice from Mr Carlo de Angeli, Senior Manager of Competitions for the IAAF, that marks that you achieved in the 2018 Mt. SAC Relays (April 21st), Bermuda Invitational (May 11th),*

Riga Cup (May 29th) and Prague (June 4th) have been ruled illegal due to your not having provided record to the IAAF that you did not gain a competitive advantage via the use of the "blades" that you compete with".

15. On 15 August 2018, Mr Leeper sent an email to Mr de Angeli stating that he was *"in the process of identifying the criteria to satisfy my burden of proof"*. Mr Leeper stated that he was *"fully commit*[ted] *to providing the IAAF the necessary data it requires in order to clear me for worldwide competition"*. He went on to seek clarification of exactly what evidence and information he was expected to provide to the IAAF:

> *"Before I can begin this process I wanted to reach out to inquire about the criteria and guidance on exactly what I am required to submit for review to the IAAF to satisfy my burden of proof. Specifically;*
>
> *(1) What specific tests are required for the burden of proof;*
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> *(2) How are the tests results evaluated;*
>
> *(3) What is the benchmark per each required test to determine if the results constitute a competitive advantage or not;*
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> *(4) What is the evaluation process by the IAAF to review the submitted paperwork;*
>
> *(5) What department or committee in the IAAF is the reviewing authority for evaluation of "burden of proof" package;*
>
> *(6) SPECIFIC FORMATTING OF DOCUMENTS. Is there an administrative requirement for formatting of documentation to submit the "burden of proof" package.*
>
> *I am fully committed to working with the IAAF to resolve this issue so I can return to competition as soon as possible. Please provide me with any necessary paperwork and reference material which will help me in assisting the IAAF in the matter".*

16. Mr Leeper did not receive a response to this request.

17. On 18 December 2019, after repeating the request several times, Mr Leeper wrote again to Mr de Angeli, stressing that the 2019 outdoor season was fast approaching and that he was *"trying to do everything I can to make sure I have the right information and approval to compete"*.

18. The following day, Mr de Angeli sent an email to Mr Leeper apologising *"for the lack of progress made to date"* and explaining that Mr Brian Roe, a member of the IAAF Technical Committee, would provide *"an update on the process envisaged for you to be able to move forward"*.

19. Mr Leeper subsequently made various requests for information about the process for determining whether specific prostheses were permitted to be used in competition under the Rule. On 30 April 2019, Mr Vijay Parbat, the IAAF's Lead Counsel Sports Law & Governance, sent a letter to Mr Leeper stating:

"The IAAF considers that prostheses are a form of mechanical aid. The burden of proving that the mechanical aid does not provide the athlete with an overall competitive advantage over an athlete not using such an aid rests with the athlete who wishes to use it. The applicable standard of proof is the balance of probabilities (i.e., more likely than not).

Rule 144(3)(d) provides the standard by which the legality of a mechanical aid will be judged but there are no specific tests that are required or any specific benchmarks that are used. Rather, it is the athlete's burden to adduce sufficient evidence (in any form that the athlete deems appropriate) to demonstrate on the balance of probabilities that his or her use of a mechanical aid would not provide him or her with an overall competitive advantage over an athlete not using such an aid.

The question for the IAAF under Rule 144(3)(d) would be whether or not the applicant athlete had established on the balance of probabilities, based on the evidence provided and all of the circumstances, that when using a mechanical aid he or she did not have an overall competitive advantage over an athlete not using such an aid".

20. Mr Parbat's letter proceeded to describe a seven-step process which the IAAF had established *"for any athlete who would like to apply for a decision that the prosthetic he or she wishes to use are permitted under Rule 144(3)(d)".* The letter explained:

"Step 1. The athlete may submit a research proposal to the IAAF. The proposal should provide all necessary information for assessing the proposal, including, but not limited to: (i) the name, qualifications, institutional affiliation, experience, research track record (grants, publications, presentations and awards) and proposed role during the research of each proposed researcher; (ii) a full description of the prosthetics to be assessed, including all relevant dimensions and technical specifications; (iii) evidence of ethical approval for the research from a duly authorised ethical review board; (iv) research background, aims and hypotheses; (v) the research methods (research design, participants, measures, statistical analyses); (vi) the proposed timelines; (vii) any funding source(s); and (viii) any declaration of any conflict(s) of interest (Research Proposal).

Step 2. The IAAF will refer the Research Proposal to the group with it to review and assess the Research Proposal and make a provisional recommendation (with reasons) to the IAAF Chief Executive Officer (CEO) as to whether (i) the Research Proposal is likely to generate the evidence relevant to the requirements of Rule 144(3)(d), and (ii) the extent to which the quality of the evidence to be generated by the Research Proposal is likely to be of sufficient weight and reliability to support an Application.

Please note that the merits of any Application will be assessed when that Application is actually made (Step 5) based on the results of the research undertaken and evidence provided. The purpose of the provisional recommendation on the Research Proposal buy the group is to increase the likelihood that an athlete obtains relevant research and (to the extent possible) avoids incurring wasted costs. For the avoidance of doubt, approval of a Research Proposal does not per se mean that an Application under Rule 144(3)(d) that contains research outlined in the research proposed will be approved.

Step 3. The CEO will consider the group's recommendation, make a decision on the questions set out at Step 2, and inform the athlete of that decision (with, where appropriate, feedback on the reasons for that decision).

Step 4. The athlete may consider the IAAF's decision on the Research Proposal and determine either to: (i) proceed with, and execute, the research (as proposed or with amendments); (ii) amend the Research Proposal and re-submit it to the IAAF for a decision on the amended Research Proposal (effectively repeating Steps 1 to 3); or (iii) not proceed to execute the proposed research.

Please note that in scenario (iii), only one re-submission of a Research Proposal will be accepted in each 12-month period from the date that the initial Research Proposal was submitted to the IAAF.

Step 5. The athlete may submit to the IAAF an application for the approval of his or her specified prostheses under Rule 144(3)(d). The application should include all supporting evidence, including (without limitation): a full description of the research project – the hypotheses addressed, research design, participants, all measures, statistical analyses, results, discussion and conclusions – together with all raw data (Application). The Application must explicitly address how the athlete has met his or her burden of proof.

Please note that any Application must relate only to the athlete that makes the Application and only to one specified pair of prosthetics.

Step 6. The CEO will refer the Application to the group which will determine the Application in accordance with Rule 144(3)(d) and will make a recommendation to the CEO to grant (conditionally or otherwise) or deny the application.

Step 7. The CEO will consider and (if he agrees) pass on the recommendation to the IAAF Council. The IAAF Council will make the final decision in respect of the Application.

Steps 5 to 7 of this process are mandatory for any athlete who would like to make an Application. Steps 1 to 4 are not mandatory (i.e., an athlete may proceed immediately to Step 5) but, as explained above, these Steps have been proposed by the IAAF so as to increase the likelihood that an athlete obtains relevant research and (to the extent possible) avoids incurring wasted costs. For the same reasons, while an athlete may commission research relevant to an Application at any time, the IAAF strongly recommends that research aiming to address the requirements of IAAF Rule 144(3)(d) does not commence without submission to the IAAF of a Research Proposal"[3].

21. Pausing there, the Panel notes that there is nothing in the IAAF rules or regulations that makes provision for an application of this sort for an antecedent determination of compliance with a technical/competition rule. Prior to the issuance of this letter, there was nothing to put an athlete on notice as to the availability of such an application or the matters to be addressed in such an application. It was not the IAAF who developed this seven-step process but rather experts at the University of Queensland at the IAAF's request.

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3 It transpires that this seven-step process was prepared by the University of Queensland group (see further below) on the request of the IAAF upon the receipt by it of Mr Leeper's inquiry as to what steps should be taken in satisfaction of the Rule. It is important to note as well that the seventh step required, at least according to its terms, the IAAF CEO to pass on (if in agreement) the group recommendation to the IAAF Council and that it was for the Council to make the final decision. As will be explored below, this did not happen.

22. On 3 July 2019, Mr Leeper's legal representatives thus made the Application for, as noted above, *"a ruling that the prosthetics that Mr Leeper currently uses, and plans to continue using, in competition in pursuit of his qualification for the 2020 Olympic Games are allowable under IAAF Rule 144.3(d)"*. The Application stated that Mr Leeper's use of RSPs did not provide him with any competitive advantage over able-bodied competitors, and instead merely provided him with the opportunity to be able to compete with them. The Application contended that the IAAF "*has not met its burden*" because it had not produced any *"convincing scientific proof"* that Mr Leeper's RSPs provide him with an *"an overall net advantage over other athletes"* (citing CAS 2008/A/1480).

23. In support of the Application, Mr Leeper's legal representatives enclosed a report by Dr Alena M. Grabowski, Dr Paolo Taboga and Dr Owen Beck (the "Grabowski Report"). The Grabowski Report contained a summary and analysis of various tests carried out on Mr Leeper by the authors for the purpose of assessing *"his ability to perform athletic tasks that contribute to 400m running performance"*, together with a comparison between Mr Leeper and non-amputee athletes and other athletes with bilateral transtibial amputations.

24. The Grabowski Report explained that between 19 and 24 August 2018 the authors had undertaken a range of tests on Mr Leeper at the University of Colorado Boulder's Applied Biomechanics Lab and a nearby high-school athletics track:

- In order to test Mr Leeper's *"Initial acceleration"*, the researchers instructed Mr Leeper to perform *"three maximum-effort accelerations out of the starting blocks"* (interspersed with a recovery period of at least five minutes). To this end, Mr Leeper placed the starting blocks in his usual competition configuration, which were then placed on top of force-measuring plates. The researchers provided *"the standard commands used in competitions"* and instructed Mr Leeper to run as fast as possible for 20 metres. During each acceleration, the researchers measured the ground reaction forces exerted by Mr Leeper and measured his horizontal velocity using a radar gun. The researchers then used a *"custom software script"* to *"filter and calculate"* the horizontal and vertical forces that Mr Leeper exerted through his RSPs on the starting blocks.

- In order to measure Mr Leeper's *"Running biomechanics and maximum velocity"*, the researchers required him to perform a set of running trials at increasing speeds on a force-measuring treadmill. If Mr Leeper was able to maintain a forward position on the treadmill for 12 consecutive steps at a particular velocity then the test was deemed to be successful, and the next test took place at a higher velocity. If the test was not successful, however, Mr Leeper *"was given the option to repeat the previous trial's velocity or deem the last successful trial his maximum velocity"*. The researchers measured the ground reaction forces exerted throughout each test. They then filtered the data and calculated the mean ground reaction force parameters and stride kinematics using another *"custom software script"*.

- In order to measure Mr Leeper's *"Curve-running"*, the researchers required Mr Leeper to perform a typical warm up procedure and then to perform *"three maximum velocity 40m sprints beginning with a standing start"* (each one interspersed with a recovery time of at least eight minutes). The sprint tests included a straight segment and a counter-clockwise

curve. The researchers recorded the entirety of each sprint using a high-speed video camera. They then measured Mr Leeper's running velocities between the 20m and 30m marks and used a mathematical model *"to predict the velocity reduction of non-amputee athletes on curves"*. They then compared Mr Leeper's *"normalized"* curve-running velocities with previously recorded data for both non-amputee athletes and athletes with unilateral transtibial amputations.

- In order to measure Mr Leeper's *"Running Economy and Aerobic Capacity"* the researchers undertook the following tests:

    - On a separate day to the tests described above, the researchers instructed Mr Leeper was required to perform five-minute sub-maximal running trials on a treadmill at speeds of 2.5 m/s, 3.0 m/s, 3.5 m/s and 4.0 m/s. During each test the researchers assessed Mr Leeper's *"rating of perceived exertion (RPE) on a scale of 6 – 20"* (which, according to the researchers, *"provides a measure of subjective effort"*). To ensure that Mr Leeper was relying primarily on aerobic metabolism during each of the tests, immediately after each test the researchers measured Mr Leeper's blood lactate concentration.

    - After completing those four trials, Mr Leeper rested for 10 minutes and then performed an aerobic capacity running test. This test began at a speed of 3.5m/s and was increased by 0.5 m/s each minute *"until* [Mr] *Leeper reached exhaustion and terminated the test"*.

    - Throughout each test the researchers measured Mr Leeper's rates of oxygen consumption and carbon dioxide production. They then calculated averages of both measures during the last two minutes of each of the tests and used this to calculate *"steady-state rates of oxygen uptake (running economy)"*. They also took an average of Mr Leeper's oxygen consumption during the final 15 seconds of the aerobic capacity test to calculate his VO2 max. They then *"normalized"* the aerobic capacity and running economy using Mr Leeper's total mass (including his RSPs). They also determined Mr Leeper's maximal oxygen uptake ("VO2 max") and velocity at maximal oxygen update ("vVO2 max").

    - The researchers compared Mr Leeper's VO2submax, VO2max and vVO2 max with those of (i) four non-amputee athletes; (ii) 10 high calibre distance runners; and (iii) Oscar Pistorius. In order to conduct that comparison, since the athlete groups were tested at different running velocities, the authors *"used linear regressions to predict their Vo2 at comparable running velocities"*.

- In order to assess Mr Leeper's *"Sprint-endurance"*, the researchers required Mr Leeper to perform six *"constant-velocity, all-out effort sprinting trials at velocities selected to elicit failure"* at durations between three seconds and five minutes on a force-measuring treadmill. In each trial Mr Leeper terminated the run when he was unable to maintain the treadmill velocity. The researchers then compared Mr Leeper's sprint-endurance profile with Oscar

Pistorius and three competitive non-amputee sprinters. In particular, they compared the length of time that Mr Leeper could sustain a fast running velocity with the length of time that the non-amputee athletes could sustain a fast running velocity.

- In addition to the tests described above, the researchers also compared Mr Leeper's splits from the 400m race in Prague where he set his personal record of 44.42 seconds to the splits of elite non-amputee runners who ran in the 400m final at the 2017 IAAF World Championships. They then compared Mr Leeper's splits to the splits predicted by his initial acceleration, maximum velocity, curve-running velocity, running economy, aerobic capacity and sprint endurance.

25. In respect of *"Initial acceleration"*, the Grabowski Report reached the following conclusions:

- Mr Leeper exerted mass-specific horizontal forces and mass-specific vertical forces which were respectively 24% and 29% lower than the forces exerted by the sub-elite non-amputee sprinters. The combined resultant force (*i.e.* the sum of the horizontal and vertical forces) was 41% lower for Mr Leeper than the sub-elite non-amputee sprinters.

- Although Mr Leeper's personal record over 100m (10.91 seconds) and maximum velocity are *faster* than *"medium level"* non-amputee sprinters, his maximum acceleration was 43.3% *slower* than the maximum acceleration of those non-amputee sprinters. Mr Leeper's average time to pass the 20m mark was 32% slower than the sub-elite non-amputee sprinters and 40% slower than elite non-amputee sprinters.

- The researchers calculated predicted times for how long it would take Mr Leeper and similar level non-amputee sprinters to run 100m. They then compared those predicted times with the individuals' actual personal records. Using values from a study conducted by di Prampero P. E. *et al.*[4] (the "di Prampero Study"), the researchers estimated that average non-amputee athletes would run 100m in 12.05 seconds, which is 0.75 seconds (6.2%) slower than those athletes' actual personal records for that event. Using the same approach, the researchers estimated that Mr Leeper would run 100m in 12.45 seconds, which is 1.54 seconds (14.1%) slower than Mr Leeper's actual personal record. Notwithstanding this, and despite the fact that Mr Leeper's calculated maximum velocity was 10.6% faster than the maximum velocity of the *"medium level"* non-amputee sprinters, Mr Leeper's slower acceleration resulted in a 3.3% slower overall time for 100m compared to non-amputee sprinters with a similar personal record.

- The researchers also calculated the predicted 100m time that Mr Leeper would run if, while maintaining his predicted maximum velocity, he was able to achieve the same acceleration as a *"medium level"* non-amputee athlete. This calculation predicted a 100m time which was 11.3% faster than Mr Leeper's predicted time using his actual acceleration. An 11.3% faster time would change Mr Leeper's actual personal record in the 100m event

4 DI PRAMPERO P. E. *et al.*, *Sprint running: a new energetic approach*. J Exp Biol, 2005. 208 (Pt 14): p. 2809-16

from 10.91 to 9.68 seconds (just 0.1 seconds slower than the world record set by a non-amputee athlete).

- The authors, therefore, concluded that, *"compared to non-amputee sprinters,* [Mr] *Leeper's initial acceleration is likely impaired by the absence of functional leg muscles and use of RSPs"*. In particular, the authors concluded that in the first 100m of a 400m race, Mr Leeper is estimated to be 1.41 seconds slower than non-amputee sprinters who have the same maximum sprinting speed.

26. In respect of *"Running biomechanics and maximum velocity"*, the Grabowski Report stated:

- Mr Leeper's maximum velocity on the treadmill (11.4 m/s) was *"the fastest recorded treadmill maximum velocity"* for a bilateral amputee athlete. An *"exceptional"* athlete with a unilateral transtibial amputation had previously recorded a maximum velocity of 11.55 m/s. An elite non-amputee sprinter had previously recorded a maximum velocity of 11.7 m/s. It follows that Mr Leeper does not have the fastest maximum velocity for athletes with a transtibial amputation, while his maximum velocity is *"similar to, but not beyond the capabilities of elite athletes with and without transtibial amputations"*.

- Compared to Oscar Pistorius, Mr Leeper's ground contact length and times were 8 - 17% longer, while Mr Leeper's ground reaction forces were 13-19% greater and his leg swing times were 26 - 49% longer. As a result, Mr Leeper's steps were 2 - 22% longer than Mr Pistorius's steps at equivalent running speeds.

- At speeds between 3 and 10 m/s, Mr Leeper's ground contact lengths and times were within 2.17 standard deviations of non-amputee athletes, while his average vertical ground reaction forces were less than two standard deviations from the non-amputee average (except at 10 m/s when they were less than 2.8 standard deviations from the average). Mr Leeper's leg swing times were less than two standard deviations from the non-amputee average at each velocity. As a result, Mr Leeper's step lengths *"were not different compared [to] non-amputee sprinters at matched velocities"*.

- At a velocity of 10 m/s, Mr Leeper's ground contact length was 4% longer than the average for non-amputee athletes, while his average vertical ground reaction forces were 6% lower, his leg swing times were 4% lower, and his steps were 3% shorter than the corresponding averages for non-amputee athletes.

- Mr Leeper's *"stance average vertical GRFs relative to bodyweight"* and *"step lengths"* were *"well within the range"* of those reported for non-amputee sprinters. His contact time, aerial time, step frequency, and leg swing time were also *"similar to those of non-amputee sprinters across a range of velocities"*. Moreover, *"strikingly"* Mr Leeper's GRFs and stride kinematics were closer to those of non-amputee sprinters than to those of Oscar Pistorius. The authors *"surmise that the stiffness of the* [different] *RSPs"* used by Mr Leeper and Mr Pistorius was *"a key contributor"* to their different biomechanics.

27. In respect of *"Curve-running"*, the Grabowski Report stated:

- Previous experimental data indicate that non-amputee athletes run 8% slower when running on an indoor track curve compared to straight-running trials. Mr Leeper was in fact 11% slower when running in the inside lane of an indoor running track curve compared to straight-running trials.

- Non-amputee runners are predicted to run 3% slower at their maximum velocity in the inside lane of an outdoor track compared to their maximum velocity during straight-running trials. Mr Leeper was in fact 6% slower when running in the inside lane of an outdoor track curve compared to his straight-running trials.

- The study confirmed the authors' hypothesis that Mr Leeper would have a slower relatively velocity when running on a curve compared to non-amputee athletes. Mr Leeper was 3% slower compared to experimental data from non-amputee athletes. The authors, therefore, posit that Mr Leeper's curve-running performance *"is slowed by the absence of functional leg muscles and use of RSPs"*.

28. In respect of *"Running Economy and Aerobic Capacity"*, the Grabowski Report stated:

- Between speeds of 2.5 and 3.5 m/s, Mr Leeper's running economy was between 1% worse and 7% better than that of Oscar Pistorius; between 4 – 6% better than that of high calibre long distance runners; and between 20 – 22% better than that of non-amputee 400m athletes.

- Mr Leeper does not have the best running economy ever reported for elite non-amputee athletes.

- Mr Leeper had *"unfortunately"* terminated the aerobic capacity test before reaching his VO2 max. The researchers nevertheless predicted his vVO2max. Mr Leeper's predicted vVO2 max was 14% slower than Oscar Pistorius, 12% slower than non-amputee 400m athletes, and 31% slower than high calibre distance runners.

- While Mr Leeper exhibited running economy values that were 20-22% better than those of non-amputee 400m athletes, his VO2 peak was 28% lower than the VO2 max of the same athletes. Moreover, his running velocity at that VO2 peak was 12% slower than the vVO2max of those athletes. Accordingly, Mr Leeper *"may run 400m at a relatively greater aerobic intensity than non-amputee athletes, which is often associated with worse running performance"*.

- The authors further observed that, in contrast to high calibre distance runners and Oscar Pistorius, Mr Leeper was unable to run at 4.0 m/s while relying solely on aerobic metabolism. This shows that his running velocity at lactate threshold is slower than those of other athletes, which *"indicat*[es] *that his running performance may be worse"* than those athletes.

- In addition, Mr Leeper's *"relatively slow running velocity"* at lactate threshold suggests that his true vVO2 max may be slower than those of non-amputee 400m athletes.

29. In respect of *"Sprint-endurance"*, the Grabowski Report stated:

- The relationship between Mr Leeper's running velocity and the time-duration to sustain each velocity was *"nearly identical"* to that of Oscar Pistorius and non-amputee athletes. Mr Leeper's sprint-endurance was thus *"statistically the same as that of non-amputee athletes"*.

- The study confirmed the authors' hypothesis that Mr Leeper would have the same time durations for relative all-out sprinting velocities as elite non-amputee athletes and Oscar Pistorius. This implies that Mr Leeper *"fatigues in the same manner as non-amputee sprinters"* during a 400m race, which in turn *"suggest*[s] *that RSPs do not facilitate different sprint-endurance performance compared to biological legs"*.

30. In respect of *"Race Splits"*, the Grabowski Report stated:

- Mr Leeper's personal best of 44.42 seconds would have placed him third in the 400m event at the 2017 IAAF World Championships. His time was within two standard deviations of the average time for the elite non-amputee athletes who competed in that event.

- During the race at which he set that personal record, Mr Leeper:

  - ran the first 100m in 11.92 seconds, which was 8.3% slower and 7.05 standard deviations outside the average time (11.01 seconds) recorded by the elite non-amputee athletes;

  - ran the second 100m in 10.32 seconds, which was 2.5% slower than the average time (10.07 seconds) of the elite non-amputee athletes;

  - ran the third 100m in 10.84 seconds, which was 0.18% faster than the average time (11.02 seconds) of the elite non-amputee athletes;

  - ran the final 100m in 11.32 seconds, making him 9.9% faster and 3.2 standard deviations outside the average time (12.57 seconds) of the elite non-amputee athletes.

- Mr Leeper's race-split velocity for the first 100m of his personal best 400m race was 1.71 m/s slower than his maximum treadmill running velocity. There are several possible reasons for this including the effect of air resistance, the fact that athletes pace themselves during a 400m race, and the fact that Mr Leeper only ran 39m during his maximum velocity treadmill running trial.

- As a result of differences between Mr Leeper's race split and the researchers' laboratory testing, it is *"difficult to translate his maximum treadmill velocity to over-ground race performance"*. Nevertheless, the authors consider that athletes who can run faster than their competitors on treadmills can also run faster during track races if they are matched at relative intensities.

- The fact that Mr Leeper ran the final 100m of the 400m race 9.9% faster than elite non-amputee athletes may be attributable to different pacing strategies.

31. The Grabowski Report stated that each of the performance tasks measured (namely acceleration, maximum velocity, curve-running velocity, aerobic metabolism and sprint-endurance) is *"likely"* to affect 400m performance. However, there are no published models that reliably predict 400m performance. Accordingly, the results of the study conducted on Mr Leeper *"must be interpreted with caution"*. The authors added that it was *"likely"* that the performance tasks are not independent, but rather interrelated with other tasks during the 400m event. Nevertheless, if Mr Leeper is unable to perform one of the performance tasks as well as a non-amputee athlete, then *"his 400m running potential is likely worse than the respective non-amputee"*.

32. The Grabowski Report concluded by providing the following *"Summary"* of the authors' principal findings:

> *"We analyzed and compared 400 m race performance tasks, as well as the underlying biomechanics and physiology of Blake Leeper, the fastest 400 m athlete with bilateral transtibial amputations who uses running-specific prostheses, to those of non-amputee athletes and Oscar Pistorius (Fig. 6). We predict that Leeper is 1.41 s slower during the acceleration out of the starting blocks over the initial 100 m compared to non-amputee sprinters. We also found that Leeper uses similar biomechanics at 10 m/s and has a similar maximum velocity as elite non-amputee sprinters. Around an outdoor track curve, Leeper would likely be 0.40 s slower than non-amputee athletes if he ran in lane 1. Leeper had better economy, a worse V̇o2max, and a slower vV̇o2max compared to non-amputee athletes, indicating that Leeper has worse aerobic metabolism compared to non-amputee sprinters. Because aerobic metabolism comprises ~40% of the metabolic energy for a 400 m sprint, it is unclear how Leeper's aerobic metabolism slows his performance compared to non-amputees. Finally, there were no differences in sprint-endurance between Leeper and non-amputee athletes. Together, the differences between Blake Leeper and non-amputee athletes during the acceleration out of the starting blocks and curve-running indicate that if Leeper had biological legs and there were no interactions with other tasks that influence 400 m performance, he could theoretically run a 400 m race 1.81 s faster compared to having artificial legs (running-specific prostheses). Thus, we have established on the balance of probabilities that the use of RSPs would not provide Leeper with an overall competitive advantage over non-amputee athletes not using such an aid (IAAF Rule 144.3(d))".*

33. On 19 July 2019, following Mr Leeper's submission of the Application and the Grabowski Report to the IAAF, Mr Parbat wrote to Mr Leeper's legal representatives explaining that:

> *"The IAAF has established a process (…) by which to determine whether or not Mr Leeper has met his burden and demonstrated that, in accordance with Rule 144.3(d), the use of his prostheses 'would not provide him with an overall competitive advantage over an athlete not using such aid'. The aim of Rule 144 is to*

'facilitate the athletes' participation in the competition as much as possible', 'whilst always ensuring the competition is conducted fairly to all'. Until it has been determined that Mr Leeper has satisfied the eligibility requirements, the IAAF cannot permit him to compete and have his results listed alongside athletes not using a mechanical aid. If the IAAF permitted Mr Leeper to compete before the determination of whether or not he has met his burden under Rule 144.3(d), it would be failing its responsibility, as the international federation for athletics, to ensure that competition is conducted fairly for all athletes.

In the meantime, Mr Leeper is eligible to compete alongside athletes not using a mechanical aid in accordance with Rule 132.3".

34. On 9 August 2019, Mr Parbat sent a further letter which explained that the IAAF was considering the Application and that, *"pending determination of the Application, the general position – the status quo – continues to apply, meaning no mechanical aid is permitted to be used in IAAF competitions (…) the only exception to that general position is that Mr Leeper may compete with mechanical aids in accordance with Rule 132.3 (i.e. only in certain competitions and on the condition that Mr Leeper's results are listed separately to those of able bodied athletes)".*

35. On 3 September 2019, Mr Parbat sent a further letter to Mr Leeper's legal representatives. The letter began by stating that it was *"plain from the express wording of Rule 144.3(d) that the burden is on the athlete"* and that the IAAF *"has repeatedly explained that the burden to show no 'overall competitive advantage' sits with Mr Leeper"*. The letter went on to state that the IAAF's Technical Committee had made appointments to a new *"Assistance Review Group"* ("ARG") which would assess the Application. The letter explained that the ARG would produce a report containing a *"provisional recommendation based on that assessment"*. Mr Leeper would then have the opportunity to provide comments on the draft report, following which the ARG would finalise its report and make its recommendation to the IAAF's chief executive officer. He would then decide whether to refer the report to the IAAF Council, in which case the IAAF Council would take a *"final and binding"* decision (subject to a right of appeal).

36. In accordance with that procedure, on 28 November 2019, the ARG produced a seven-page provisional report (the "ARG Provisional Report") which was provided to Mr Leeper. This explained that the ARG's *"provisional recommendation"* was that the Application be denied *"on the basis that Mr Leeper has not met his burden of proof to show that his use of prostheses would not provide him with an overall competitive advantage over an athlete not using such prostheses".*

37. The ARG Provisional Report contained a critique of the Grabowski Report's conclusion that that if Mr Leeper had biological legs then he could theoretically run a 400m race 1.81 seconds faster compared to having RSPs.

38. The ARG Provisional Report stated that the conclusion that Mr Leeper would run the first 100m of a 400m 1.41 seconds slower than if he had biological legs was *"questionable"* for the following reasons:

    - First, Mr Leeper's actual personal record for 100m is 0.13 seconds faster than the personal record time (if he had biological legs) of 11.04 seconds predicted by the Grabowski

Report. The fact that Mr Leeper's actual personal best is faster than his predicted personal best if he had biological legs suggests that his RSPs help him to run faster than if he had biological legs.

- Second, the Grabowski Report predicted that Mr Leeper's personal record time for the 100m using his RSPs would be 12.45 seconds. This is 1.54 seconds slower than Mr Leeper's actual personal record of 10.91 seconds. This indicates that the methods used in the Grabowski Report for predicting record 100m times are not valid in Mr Leeper's case.

- Third, Mr Leeper's predicted personal best time for 100m using his RSPs (12.45 seconds) is 0.53 seconds slower than Mr Leeper has actually run the first 100m of a 400m race (11.92 seconds). The first 100m of a 400m race is typically fast, but not maximal. Despite this, Mr Leeper ran the first 100m of a 400m race faster than the Grabowski Report predicted his personal record for the 100m would be. This is a further indication that the formula employed by the Grabowski Report is not valid in Mr Leeper's case.

39. The ARG Provisional Report also stated that the Grabowski Report's conclusion that Mr Leeper would run the third 100m of a 400m race in a time 0.40 seconds slower than if he had biological legs was *"questionable"*. In particular:

- When Mr Leeper set his personal best of 44.42 seconds in Prague in June 2017, his average velocity for the straight was 9.69 m/s and his average velocity for the curve was 9.23 m/s. Both of these velocities are faster than the maximum running velocities reported in the experimental data in the Grabowski Report (9.49 m/s and 8.94 m/s respectively).

- In addition, Mr Leeper's normalised curve running velocity during the race was higher (0.953) than his normalised curve running velocity under experimental conditions. This shows that Mr Leeper slowed down less on the curve during the race conditions than in the experiment. This suggests that the experimental conditions *"might not accurately reflect race conditions"*.

- According to Greene's curve running model[5], non-amputees running at the same speed as Mr Leeper in lane six would be predicted to run 2.2% slower in the third 100m of the 400m event. However, in the race where he set his personal record, Mr Leeper slowed by 4.8% and the non-amputee athlete slowed by 8.6% during that segment of the race. This indicates that (a) Mr Leeper slowed considerably less than the non-amputee athletes; and (b) the formula used by the Grabowski Report is not valid for predicting running velocity or time taken to complete the third quarter of a 400m race under competition conditions.

40. On 18 December 2019, Mr Leeper provided the IAAF with comments responding to the ARG Provisional Report and a response to that report from the authors of the Grabowski Report (the "Grabowski Reply Report"). The Grabowski Reply Report stated, among other things, that:

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5 GREENE P. R., *Running on flat turns: experiments, theory, and applications*. J Biomech Eng, 1985. 107(2): p. 96-103.

- The ARG Provisional Report erroneously mixed lab-based and track-based measurements and compared athletes' performances under different circumstances that are not controlled. Accordingly, those comparisons were invalid.

- Laboratory-based measurements are *"extremely useful"* in providing comparisons between athletes with and without amputations, because all athletes can be tested under exactly the same circumstances and potential co-variables (such as the weather) can be controlled. Accordingly, the performance differences between athletes measured in a laboratory environment are strongly correlated with performance difference between athletes in competition (in other words, sprinters who are faster in laboratory conditions are also faster in track conditions).

- Laboratory-based measurements, however, cannot perfectly predict performance on the track, since track performance is affected by various co-variables (*e.g.* weather, wind, the impact of competition against other elite athletes etc.). Those variables can confound laboratory-based performance predictions.

- Mr Leeper did not have an advantage in any of the performance-based metrics tested in laboratory conditions. It follows that he therefore does not have an advantage on the track compared to elite non-amputee sprinters.

- It is unsurprising that Mr Leeper's predicted personal best time in the laboratory is slower than his actual personal best time on the track, since his performance on the date when he achieved his personal best could have been improved by a variety of individual conditions. In this regard, it is notable that in the di Prampero Study the authors had estimated that the average non-amputee athletes would run 100m in 12.05 seconds, which is 0.75 seconds slower than the actual reported personal bests of those athletes.

- Accordingly, the ARG Provisional Report is wrong to say that the difference between Mr Leeper's laboratory-based predicted times and his actual personal best on the track suggests that his RSPs enable him to run faster than if he had biological legs. On the contrary, the same difference between predicted and actual track results is seen for non-amputee athletes. Accordingly, the existence of this difference in relation to Mr Leeper *"is wholly consistent with the proposition that his use of prostheses does not help him run faster than if he had biological legs"*.

- Moreover, when Mr Leeper's performance is compared to elite non-amputee athletes with a similar personal record, the Grabowski Report found that Mr Leeper's slower acceleration results in a 3.3% slower overall time for 100m compared to those non-amputee athletes. Accordingly, controlling for differences between laboratory and track results, Mr Leeper is in fact slower, not faster, than elite non-amputees.

- Analysis of Mr Leeper's actual race splits for the first 100m also shows that he is consistently slower over the first 100m compared to elite non-amputee athletes.

41. The Grabowski Reply Report next addressed the statement in the ARG Provisional Report that the difference between Mr Leeper's actual personal best over 100m (10.91 seconds) and his predicted personal record if he had biological legs (11.04 seconds) suggests that Mr Leeper's RSPs help him to run faster than if he had biological legs. In response, the Grabowski Reply Report stated:

    - As detailed in the Grabowski Report, Mr Leeper was found to be 40% slower at reaching the 20m mark from the starting blocks than elite non-amputee athletes. On the basis of those data, Mr Leeper was predicted to run the first 100m 1.41 seconds slower than elite non-amputee sprinters.

    - Athletes who accelerate out of the starting blocks and run 20m faster than their competitors in the laboratory are also faster than their competitors in track races. The prediction is therefore consistent with the conclusion that Mr Leeper's RSPs do not confer any performance advantage.

42. The Grabowski Reply Report also addressed the ARG's statement that the fact that Mr Leeper's predicted record time from the 100m using his RSPs (12.45 seconds) was 1.54 seconds slower than his actual record time using his RSPs (10.91 seconds) suggests that the methods used by the Grabowski Report for predicting record 100m times are not valid. In response, the Grabowski Reply Report stated:

    - Co-variables create *"potential discrepancies"* between laboratory-based measurements and track-based measurements. Laboratory-based measurements are, however, strongly correlated with (and therefore can be used effectively to predict) track-based performance.

    - The Grabowski Report used exactly the same methods to predict Mr Leeper's 100m time as were used to predict the 100m time of the elite non-amputee sprinters. These methods yielded a prediction that Mr Leeper would run 100m 1.41 seconds slower than elite non-amputee sprinters. This reflects the differences between Mr Leeper's acceleration and the acceleration of the non-amputee sprinters over the first 20m.

43. In respect of the ARG's criticisms of the Grabowski Report's conclusion that Mr Leeper would run the third 100m of a 400m race 0.40 seconds faster if he had biological legs, the Grabowski Reply Report stated:

    - Normalised maximum curve running velocity depends on the curve radius. In the experiment conducted on Mr Leeper, the researchers measured the effect of curve running in lane 1 (which has a radius of 36.5m). However, when Mr Leeper set his personal record in Prague he was running in lane 6 (which has a radius of 42.6m).

    - Using the formula developed by Greene P. R., a non-amputee with a maximum velocity on the straight section of 9.69 m/s would slow to a maximum velocity of 9.49 m/s in

lane 6. This corresponds to a normalised running velocity of 0.975. Mr Leeper's normalised curve running velocity was 0.953, which is slower than the predicted curve running velocity of non-amputees.

- Greene's curve running model is used to calculate the upper limit to the maximum running velocity in a non-fatigued state. However actual running velocity during a race depends on a variety of factors including strategy and fatigue. Greene's formula is good at predicting how much an athlete's maximum velocity on a curve reduces relative to their maximum velocity on a straight. Using this formula, Mr Leeper's maximum curve-running velocity is relatively slower than non-amputees, meaning that his use of RSPs does not provide him with an overall competitive advantage.

44. On 7 February 2020, the Chair of the ARG, Mr Brian Roe, sent a letter to the IAAF's chief executive officer, Mr Ridgeon. The letter enclosed a copy of the ARG's 12-page Final Report on Mr Leeper's Application (the "ARG Final Report").

45. The ARG Final Report stated that the ARG had considered Mr Leeper's response to the ARG Provisional Report and the Grabowski Reply Report. Nothing in those documents changed the reasoning and conclusions set out in the ARG Provisional Report. The ARG Final Report, therefore, repeated the conclusions set out in the ARG Provisional Report. It also responded to a number of the criticisms made by Dr Grabowski and her colleagues concerning the ARG Provisional Report. In this regard, the ARG Final Report stated, among other things, that:

- The Grabowski Reply Report contains no new evidence beyond what is already set out in the Grabowski Report.

- Although it would be good scientific practice to specify confidence limits in respect of the researchers' conclusion that Mr Leeper's performance would be 1.81 seconds faster if he had biological legs, the Grabowski Report provided no such limits.

- The Grabowski Reply Report overstates the level of control in the study described in the Grabowski Report. In particular, the finding that Mr Leeper would run the first 100m of a 400m race 1.41 seconds faster if he had biological legs was based on acceleration values for non-amputee sprinters reported in the di Prampero Study. However, there are *"multiple marked differences"* between the data obtained from Mr Leeper and the data in the di Prampero Study. In particular:

    - The di Prampero Study data were reported in 2005, whereas the data concerning Mr Leeper were reported 14 years later.

    - The di Prampero Study data was collected on an outdoor track in Italy, whereas the data concerning Mr Leeper was collected on an indoor track in the United States. The barometric and temperature conditions under which the data concerning Mr Leeper were collected were not reported.

- The di Prampero Study recorded data from accelerations over a distance of 30m, whereas the data concerning Mr Leeper was recorded from accelerations over 20m.

- The di Prampero Study used medium-level sprinters. Mr Leeper, however, wishes to compete at the *elite* level and to establish that he does not have an advantage compared to *elite* non-amputee sprinters.

- There were differences the location, type and frequency of the radar systems used in the two studies. Further, while the di Prampero Study involved a reliability trial, no equivalent reliability trial was conducted by the authors of the Grabowski Report.

- The magnitude of the difference in the Grabowski Report between Mr Leeper's predicted personal best time for 100m using RSPs (12.45 seconds) and his actual personal best (10.91 seconds) is approximately 12.4%. This is comparable to the performance difference in elite-level athletics between men and women. The difference is not the sort that could occur as a result of wind conditions or the effect of competing in a packed stadium. The magnitude of the difference between the actual and predicted times is so great as to indicate that the prediction is not valid.

- The stated aim of the di Prampero Study was to estimate the energy cost and metabolic power of the first 30m of an all-out run from a stationary start and from the measured forward speed and acceleration. The Grabowski Report, however, uses the findings of that study for an entirely different purpose, namely, to predict the 100m running time for a bilateral transtibial amputee using ARGs. The ARG is not aware whether the formula in the di Prampero study has been validated for predicting 100m times of any athletes. The *"implausibly large difference"* between Mr Leeper's predicted and actual running times suggests that the formula cannot validly be used for that purpose.

46. On 18 February 2020, Mr Ridgeon sent a letter to Mr Leeper which stated that he had failed to discharge the burden of establishing that his RSPs do not provide him with an overall competitive advantage (the "Appealed Decision"). The letter stated:

> *"I have now considered the letter from Mr Roe and its enclosures and determined, in my capacity as Chief Executive Officer of World Athletics, to accept the ARG's recommendation in respect of Mr Leeper's application. Accordingly, World Athletics' final decision is that Mr Leeper's application be denied on the basis that Mr Leeper has not met his burden of proof to show on the balance of probabilities that his use of prostheses would not provide him with an overall competitive advantage over an athlete not using prostheses.*
>
> *Mr Leeper has a right of appeal against World Athletics' decision, which you will be aware of from World Athletics' previous correspondence in relation to this matter".*

IV. PROCEEDINGS BEFORE THE COURT OF ARBITRATION FOR SPORT

47. On 27 February 2020, Mr Leeper filed his Statement of Appeal with the CAS against the IAAF with respect to the Appealed Decision. In his Statement of Appeal, Mr Leeper nominated Mr Klaus Reichert SC as an arbitrator. Pursuant to Articles R44.2 and R52 of the CAS Code, Mr Leeper also requested an expedited hearing of the appeal, with a decision to be rendered by 1 May 2020.

48. On 2 March 2020, Mr Leeper informed the CAS Court Office that he wished for his Statement of Appeal to be considered as his Appeal Brief pursuant to Article R51 of the CAS Code.

49. On 6 March 2020, the IAAF confirmed its agreement for an expedited hearing to take place by mid-April 2020 on condition that (i) Article R56 of the CAS Code would apply; (ii) the IAAF would have 30 days to submit its Answer; and (iii) Dr Grabowski would provide an explanation of her rejection of the position set out in the ARG Final Report within seven days.

50. On 7 March 2020, Mr Leeper wrote to the CAS undertaking to submit a response from Dr Grabowski to the ARG Final Report by 13 March 2020 and requesting that the IAAF appoint its arbitrator forthwith to enable the hearing date to be scheduled as soon as possible.

51. On 9 March 2020, the CAS Court Office wrote to the parties noting Mr Leeper's undertaking and explaining that, subject to the fulfilment of that commitment, the procedure would take place on an expedited basis in accordance with Article R52 of the CAS Code.

52. On 13 March 2020, Mr Leeper served a copy of Dr Grabowski's response to the ARG's Final Report.

53. On 16 March 2020, the IAAF nominated Mr Michael Beloff QC as an arbitrator.

54. On 17 March 2020, the CAS Court Office informed the parties that the procedure would be considered expedited in accordance with Article R52 of the CAS Code.

55. On 19 March 2020, Mr Beloff QC declined to serve as arbitrator in the present case. Accordingly, the IAAF instead nominated Mr Murray Rosen QC to act as an arbitrator.

56. On 25 March 2020, the CAS Court Office wrote to the parties noting the travel restrictions imposed as a consequence of the COVID-19 pandemic, the postponement of the Olympic and Paralympic Games, and the logistical difficulties of conducting a remote hearing. The CAS Court Office, therefore, sought the parties' respective views as to whether the hearing should be deferred by two to three months in the hope that an in-person hearing would then be feasible.

57. The parties both responded later the same day:

- The IAAF agreed that an expedited process was no longer necessary or appropriate. The IAAF also sought an order pursuant to Article R44.3 of the CAS Code requiring the Athlete to produce the *"raw data"* which was generated and analysed in the Grabowski

Report. The IAAF submitted that disclosure of that data was necessary in order to enable both sides to consider the data on equal terms and to advance whatever points they wish to make about them. The IAAF requested a suspension of the deadline for filing its Answer pending the provision of such raw data.

- Mr Leeper stated that the case should continue on an expedited basis. Regarding the IAAF's disclosure application, Mr Leeper submitted that the application for an order under Article R44.3 of the CAS Code was premature since the CAS Panel had not yet been constituted, and *"conflate*[d] *a scientific inquiry with the appeal of a decision made in this case"*.

58. On 26 March 2020, the CAS Court Office notified the parties that, in accordance with Article R32 of the CAS Code, the IAAF's request for raw data was reserved for the Panel, once constituted. The letter further stated that the deadline for the submission of the IAAF's Answer would be re-set by the Panel, once constituted, on an expedited basis following resolution of the issue regarding the raw data.

59. On 6 April 2020, the CAS Court Office, on behalf of the President of the Appeals Arbitration Division, confirmed the constitution of the Panel as follows:

President:	Mr James Drake QC, Barrister in London, United Kingdom.
Arbitrators:	Mr Klaus Reichert SC, Attorney-at-Law in London, United Kingdom;
	Mr Murray Rosen QC, Barrister in London, United Kingdom.

60. On 9 April 2020, the CAS Court Office wrote to the parties inviting the IAAF to provide its complete request for the raw data in accordance with Article R44.3 of the CAS Code by 15 April 2020.

61. On 10 April 2020, Mr Leeper sent a letter referring to the earlier suspension of the deadline for the IAAF to file its Answer. The letter stated that, in the circumstances, the IAAF should submit its Answer by 17 April 2020. The letter further stated that the IAAF's request for the raw data was both *"wholly inappropriate"* and made *"far too late"*. It added, however, that if the Panel considered that further data should be produced, then this should be addressed by way of supplemental filings without delaying the proceedings.

62. On 15 April 2020, the IAAF responded to the letter from the CAS Court Office dated 9 April 2020. The IAAF submitted that the raw data in question exist and are likely to be relevant to the resolution of the present dispute. In particular, if the Panel rejects Mr Leeper's submissions concerning the burden of proof, then it will need to examine the study on which the Grabowski Report is based, in order to consider the reliability of the raw data generated and to determine what conclusions can reliably be drawn from those data. The Grabowski Report has not been published, nor has it been subject to peer review. Accordingly, unless the raw data are produced to the IAAF to enable its experts to analyse the data, the Panel will be unable to determine whether the conclusions in the Grabowski Report are accurate.

63. On 17 April 2020, the CAS Court Office notified the parties that the IAAF's application for raw data would be determined by the Panel following receipt of Mr Leeper's submissions in response to that application. In the meantime, the deadline for filing the IAAF's Answer remained suspended.

64. On 20 April 2020, Mr Edward Craven, Barrister in London, United Kingdom, was appointed as *Ad hoc* Clerk in these proceedings.

65. On 23 April 2020, Mr Leeper's representatives notified the CAS Court Office that the parties had reached agreement regarding the IAAF's application for production of the raw data from the study conducted by Dr Grabowski. Specifically, the parties had agreed that Mr Leeper would produce the raw data by 1 May 2020 and Dr Grabowski would be entitled to make a responsive submission should the IAAF's Appeal Brief or experts make any argument based on the materials produced.

66. On 28 April 2020, the IAAF wrote to the CAS seeking an order pursuant to Article R44.3 of the CAS Code requiring Mr Leeper to disclose:

> *"(a) the height the Appellant proposes to run at in World Athletics competitions; and*
>
> *(b) what the Appellant's maximum allowable height would be under the 2018 MASH rule (if he knows), including the measurements on which the calculation is based and when and by who the measurements were taken; and*
>
> *(c) (if he does not know the information set out at (b)) what the Appellant's measurements were under the pre-2018 MASH rules (e.g., femur/thigh length, sitting height, humerus/upper arm length), so that these measurements can be used to help calculate what his maximum allowable height would be under the 2018 MASH rule".*

67. In support of that request, the IAAF submitted:

- The Panel will need to determine whether Mr Leeper's prosthetic blades provide him with any competitive advantage against a runner not using prosthetic blades. According to the manufacturer's information, the user of the prosthetic blades can choose at which height to fix his blades.

- The IPC and World Para Athletics have established a Maximum Allowable Standing Height ("MASH") rule, which uses a formula to determine how long an athlete's lower legs would be and, therefore, how tall he would be if he was not an amputee. Under the MASH rule, a competitor must fix his blades so that he is not taller than his MASH when he races.

- The IPC amended the MASH rule with effect from 1 January 2018. In June 2018, the IPC noted that in most cases the new MASH rule had reduced the length of the blades

used by most double leg amputees. According to the IAAF, this reduction in length *"coincided with a marked drop off in personal bests from at least some of the athletes affected"*.

- During an interview in late 2019, Mr Leeper said that his height had been *"change*[d] *(…) dramatically"* by the amendment to the MASH rule. Accordingly, the IAAF submitted that Mr Leeper is *"running tall"*, *i.e.* his blades are longer than his lower limbs would be if they were intact.

- Since non-amputee runners are unable artificially to increase the length of their lower limbs to increase their stride length, the use of blades by an amputee runner such as Mr Leeper is a potential advantage which *"needs to be assessed and weighted in the balance with other advantages and against any disadvantages"*.

- This issue is not properly addressed in the Grabowski Report. The IAAF's experts do not agree with the statement in the Grabowski Report that a 4cm difference in prosthetic height does not affect maximum speed.

- It follows that the IAAF and the Panel are entitled to know (a) the height at which Mr Leeper is currently running and proposes to run at in IAAF competitions; (b) to what extent this differs from the height he would run at if his legs were intact; and (c) what Mr Leeper's measurements were under the pre-2018 MASH rule, since those measurements can be used in order to help calculate his maximum allowable height under the 2018 MASH rule.

68. On 1 May 2020, Mr Leeper responded to the IAAF's request. He submitted that:

- The request was outside the scope of Article R44.3 of the CAS Code, since rather than seeking the production of documents, it instead sought an order requiring Mr Leeper to state his intentions as to the height he proposes to run at in international athletics competitions and his opinions as to what his permissible height would be under regulations adopted by organisations other than the IAAF.

- Furthermore, whether or not Mr Leeper met criteria under the MASH rules adopted by the IPC and World Para Athletics is irrelevant to the issues in this appeal. In particular, the MASH rules govern the use of prosthetic legs by a disabled athlete in a variety of events when competing against *other disabled athletes*. The rules have not been adopted for, and do not apply to, IAAF competitions between disabled and able-bodied athletes. Accordingly, the MASH rules are not relevant to the issue before the Panel, namely (i) whether Mr Leeper has an overall competitive advantage in a 400m race against able-bodied athletes; (ii) whether the IAAF has impermissibly shifted the burden of proof; and (iii) whether the IAAF has unlawfully discriminated against Mr Leeper.

69. On 4 May 2020, the CAS Court Office sent a letter on behalf of the Panel to the parties which directed Mr Leeper to provide the following information by 30 May 2020:

"1. At what height does the Appellant currently intend to compete at the World Athletics competitions?

2. If the Appellant knows, what is the Appellant's MASH pursuant to the World Para Athletics Rules and Regulations 2020-21?

3. If the Appellant does not know the answer to no. 2, the Appellant should provide the relevant body measurements so that his MASH can be determined".

70. On 7 May 2020, Mr Leeper filed a request under Article R 44.3 of the CAS Code for a direction requiring the IAAF to disclose all documents: (a) discussing whether, or any extent to which, Mr Leeper's RSPs may or may not provide him with any advantage against able-bodied athletes in the 400m event; and (b) discussing any reasons for the proposed and actual change in the burden of proof from the IAAF to the athlete in current Technical Rule 6.3.4 (formerly IAAF Competition Rule 144.3(d)) or any other iteration of that rule.

71. On 8 May 2020, the CAS Court Office requested the IAAF to confirm by 15 May 2020 whether it intended to produce the documents sought by Mr Leeper, or to state the basis of its objection to the request.

72. On 15 May 2020, the IAAF notified the Panel of its objection to Mr Leeper's disclosure application. In respect of the first category of documents sought by the application, the IAAF submitted that there was no basis for the speculative suggestion that non-scientific members of the ARG may have influenced its conclusions on non-scientific grounds, or that there were communications which showed that the Application was considered on non-scientific grounds. Moreover, since the Panel will be conducting a *de novo* hearing of the merits of the case – rather than a review of the decision under appeal – an allegation that the governing body pre-determined the outcome of the application makes no difference to the outcome of the appeal. In respect of the second category of documents, the IAAF submitted this was a fishing expedition made to support allegations which are not based on any evidence.

73. On 21 May 2020, the CAS Court Office notified the parties that the Panel had concluded that Mr Leeper disclosure application dated 7 May 2020 was premature and that he should await the IAAF's Answer. If, on receipt of the Answer, Mr Leeper wished to renew his application (either in whole or in part) then he should do so promptly upon receipt of the Answer.

74. On 22 May 2020, Mr Leeper filed a statement from himself and a summary statement from Dr Hugh Herr.

75. On 26 May 2020, Mr Leeper responded to the Panel request of 4 May 2020. The response stated that:

- Mr Leeper intended to compete at a height of 189.2 cm in international competitions.

- As a result of *"potential uncertainties in how the World Para Athletics Rules and Regulations 2020-21 mat be interpreted"*, Mr Leeper *"does not know (…) for certain"* what his MASH is under those rules and regulations.

- Mr Leeper's relevant body measurements are as follows:

    - Seated height: 91.4cm
    - Thigh length from greater trochanter to tibiale laterale: 44.5cm
    - Upper arm: 29.0cm
    - Ulna/forearm: 28.0cm

76. On 1 June 2020, the IAAF filed its Answer and supporting evidence.

77. On 3 June 2020, Mr Leeper notified the CAS that he had decided to renew the application for disclosure in its entirety. In addition, Mr Leeper also sought an order requiring the IAAF to disclose:

    - *"All documents relating to: (a) any consideration by the IAAF of applying or not applying any MASH criteria (original or revised) ("MASH criteria") to any disabled or able-bodied athletes; (b) any consideration by the IAAF of whether or not to adopt any MASH criteria as part of its eligibility rules; (c) IAAF's decision not to adopt the MASH criteria as part of its eligibility rules; (d) any consideration by the IAAF of any criteria relating to an athlete's height or limb proportions in relation to his/her competitiveness; (e) any prior application by the IAAF of any MASH criteria to Mr Leeper or any other athlete, whether able-bodied or disabled; (f) IAAF's consideration of the purported claim that the Appellant "runs on blades that increase his leg length artificially by close to 15cm has a direct impact on his maximum velocity, and therefore on his 400m time (see para 6.37 et seq)"; (g) IAAF's determination that compliance with the MASH criteria is essential to Mr Leeper's eligibility, including when and how that determination was made; (h) IAAF's consideration of claimed scientific analysis of Mr Leeper's supposed advantage based upon whether he complied with the MASH criteria; and (i) any consideration by the IAAF (including the ARG) of any other scientific criteria or study regarding whether the use of prostheses by a disabled athlete in the 400m event gives the athlete an overall advantage over able-bodies competitors, or any particular advantage or disadvantage during that event"*; and

    - *"All documents (a) relating to the IAAF's consideration of the proposed and actual change in the burden of proof from the IAAF to the athlete regarding the use of an "aid" in current Technical Rule 6.3.4, former Competition Rule 144.3(d), or any other iteration of said rule; or (b) evidencing or discussing any complaints from IAAF stakeholders that disabled athletes using prosthetics should not be able to compete against able bodied athletes, or should be able to do so subject to limitations or changed IAAF rules".*

78. On 8 June 2020, the IAAF filed a detailed written response explaining why the IAAF opposed the disclosure application.

79. On the same date, Mr Leeper applied for permission to adduce further evidence in the form of a witness statement from his coach, Mr Willie Gault. Mr Leeper submitted that the IAAF's Answer contained a new allegation that improvements in Mr Leeper's 400m results have been

caused by changes that Mr Leeper has made over time to his RSPs. Accordingly, in order to respond to that allegation (which Mr Leeper stated was both *"extremely serious"* and *"false"*) Mr Leeper sought permission under Article 44.3 of the CAS Code to adduce a statement from Mr Gault explaining how the improvements in Mr Leeper's times have been caused by changes to his training and technique, rather than changes to his RSPs. Later the same day, the IAAF submitted a letter opposing the application to admit Mr Gault's statement.

80. On 10 June 2020, the CAS Court Office notified the parties that the Panel had determined that:

- The IAAF shall disclose all correspondence passing between the IAAF and the ARG (and/or its individual members) and all correspondence between the ARG and third parties in respect of the ARG's consideration of Mr Leeper's Application.

- The IAAF shall make a reasonable search and produce any documents within its custody or under its control (i) relating to the IAAF's consideration of the proposed and actual change in the burden of proof from the IAAF to the athlete in the Rule; and (ii) evidencing or discussing any complaints from the IAAF's stakeholders that disabled athletes using prosthetics should not be able to compete against able-bodied athletes or should be able to but subject to limitations.

- Save as aforesaid, the Panel made no further order for disclosure.

81. On 11 June 2020, the CAS Court Office notified the parties that the Panel had granted permission to rely on the witness statement of Mr Gault.

82. On 12 June 2020, Mr Leeper filed a *"Response"* from Dr Grabowski which addressed criticisms of the Grabowski Report made in the IAAF's Answer and expert evidence.

83. On 16 June 2020, the CAS Court Office requested the Parties to confer and provide the Panel with an agreed *"List of issues"* to be determined by the Panel in relation to the scientific evidence.

84. On 18 June 2020, the IAAF wrote to the CAS Court Office stating that the applicable rules are the World Athletics Constitution, effective 1 January 2019; Competition Rules, in force from 1 November 2019; Technical Rules, in force from 1 November 2019; and Disputes and Disciplinary Proceedings Rules, in force from 1 November 2019; supported by the World Athletics Book of Rules Generally Applicable Definitions.

85. On 19 June 2020, Mr Leeper wrote to the CAS stating that the applicable rules are the IAAF Competition Rules in force when the dispute arose, not the rules referred to be the IAAF in its communication dated 18 June. The Appellant added that this was not a mere technical issue, but rather a substantial difference concerning the applicable substantive law.

86. On 23 June 2020, the IAAF requested the CAS Panel to refile the Dr Grabowski's *"Response"* dated 12 June 2020 without passages which, in the IAAF's submission, did not address the arguments made by the IAAF or its experts based on the raw data from the study conducted

by Dr Grabowski (which was the only matter which Dr Grabowski was permitted to address in her "Response").

87. On 24 June 2020, Mr Leeper responded by stating that there was no basis to strike out any part of Dr Grabowski's *"Response"*, which he submitted was fully consistent with the Panel's directions and the parties' prior agreements.

88. On 27 June 2020, Mr Leeper made an application for an order requiring the IAAF to produce unredacted versions of certain documents disclosed by the IAAF on 24 June, to enable them Panel to conduct an *in camera* review of the materials to determine whether they contain relevant information that must be disclosed to Mr Leeper pursuant to the direction dated 10 June 2020.

89. On 29 June 2020, the CAS Panel notified the party that Dr Grabowski's *"Response"* went well beyond a response to any argument made by the IAAF or its experts in relation to the raw data. Consequently, the *"Response"* exceeded the agreement between the parties and the direction made by the Panel on 23 April 2020. The Panel proceeded to explain that it was prepared to permit Mr Leeper to rely on the *"Response"* on the basis that it does address certain matters that may be of assistance to the Panel; however it follows that the IAAF must be permitted to respond to the further material in any way it sees fit. Accordingly, the Panel granted the IAAF permission to do so.

90. On 1 July 2020, the IAAF wrote to the CAS Court Office rejecting Mr Leeper's purported concerns about the redactions made on confidentiality grounds to the disclosure provided on 24 June. The letter further stated that the material redacted on grounds of privilege *"consists of two emails sent by Huw Roberts (a Bird & Bird employee and counsel at the time to the IAAF) to IAAF personnel (Paul Hardy and Imre Matrahazi, cc Essar Gabriel), in connection with and for the purpose of providing them with legal advice"*.

91. On the same date, the CAS Court Office wrote to the IAAF on behalf of the Panel seeking clarification of the role of Mr Roberts and, in particular, whether the redacted emails were sent in his capacity as the IAAF's internal legal counsel and, if so, on what basis legal privilege was asserted as a matter of Swiss law.

92. On 3 July 2020, the IAAF replied to that enquiry. The IAAF stated that it took the position that legal privilege is a substantive issue which is determined by the law of Monaco and that, under Monegasque law, no distinction is drawn (for the purposes of legal privilege) between external and internal counsel. The IAAF further stated that, in any event, the point was moot since *"Mr Roberts was not an employee of the IAAF. Rather he was a full-time employee of Bird & Bird, and his services were provided to the IAAF as independent external counsel in accordance with standard engagement terms"*.

93. On 6 July 2020, the CAS Court Office notified the parties that the Panel rejected Mr Leeper's request for unredacted copies of the documents which were said by the IAAF to be confidential and irrelevant. In respect of the two email chains which contained redactions of what was said to be privileged material, the IAAF was directed to provide copies of the correspondence to be reviewed by the Panel in camera, following which the Panel would determine the issue of

privilege. The IAAF provided the Panel with copies of those email chains later the same day. After reviewing the email chains in camera, the Panel notified that the parties that it had concluded that the redacted material was privileged from production.

94. On 8 July 2020, the Panel requested the parties to consider whether they would agree to authorise the Panel to decide this appeal *ex aequo et bono* in accordance with Article R45 of the CAS Code.

95. On 10 July 2020, Mr Leeper and the IAAF, respectively, signed and returned the order of procedure in this matter.

96. On the same date, the IAAF served supplementary reports from its experts.

97. On 13 July 2015, Mr Leeper notified the Panel that he consented to the Panel proceeding under the principle *ex aequo et bono*.

98. On 13 and 15 July 2020, a hearing was held by video-link. The Panel was assisted by Mr Brent Nowicki, Managing Counsel, and Mr Edward Craven, *ad hoc* clerk, and joined by video-link by the following legal counsel or party representatives:

    For Mr Leeper: Blake Leeper, Jeffrey L. Kessler, Mathilde Lefranc-Barthe, Michael J. Stepek, Angela Smedley, David Feher, Benjamin Gordon.

    For the IAAF: Jonathan Taylor QC, Chris Lavey, Katie Rimmer, Vijay Parbat.

99. At the outset of the hearing, each of the parties confirmed that they had no objection to the Panel and, specifically, that they had no objection to the Panel proceeding to decide this dispute.

100. During the course of the hearing, the IAAF notified the Panel that it did not authorise the Panel to decide the appeal *ex aequo et bono*.

101. In addition, following discussion of the parties' respective requests for relief, each party indicated that it would not oppose the other party's amending its pleaded request for relief. Accordingly, the Panel directed the parties to file amended requests for relief within a short timescale following the hearing.

102. At the conclusion of the hearing, each of the parties confirmed that their right to be heard had been fully and fairly respected.

103. Following the conclusion of the hearing, as directed by the Panel each of the parties submitted an amended request for relief. The terms of those amendments (which neither party opposed) are set out below.

V. SUMMARY OF PARTIES' SUBMISSIONS AND EVIDENCE

A. Mr Leeper

104. Mr Leeper's submissions may be summarised as follows.

105. Mr Leeper submits that the Rule unlawfully places the burden of proof on him to demonstrate that he does not derive an overall competitive advantage from the use of RSPs. In particular, he submits that placing the burden of proof on the athlete violates the principles expounded in CAS 2008/A/1480 and other CAS jurisprudence. In CAS 2008/A/1480, the CAS Panel noted that *"the IAAF rightly accepted"* that it bore the burden of proving that the disabled athlete's prosthetics provided him with a competitive advantage. The Panel stated that, *"to propose that a passive device such as* [the prosthetic used by Mr Pistorius] *(…) should be classified as contravening that Rule without convincing scientific proof that it provides him with an overall net advantage over other athletes flies in the face of both legal principle and common sense"*. Mr Leeper submits that, as in CAS 2008/A/1480, his RSPs are a passive device and, therefore, applying the principles set out in CAS 2008/A/1480, the IAAF must present convincing scientific proof of an overall net advantage before Mr Leeper could be declared ineligible to compete.

106. Mr Leeper submits that the amendments to the language of the rule do not remove the IAAF's burden of establishing the existence of a non-discriminatory need for placing the burden of proof on a disabled athlete such as Mr Leeper. The Rule is discriminatory on its face since:

- it only applies to athletes who use a mechanical aid; and

- it is impossible for any amputee runner to participate in competition without a mechanical aid.

107. The revision to the rule was, moreover, specifically designed by the IAAF to address the use of prosthetics by disabled athletes. Consequently, in accordance with established CAS jurisprudence the IAAF bears the burden of demonstrating that the discriminatory rule is both reasonable and proportionate.

108. Mr Leeper further submits that the discriminatory effect of the Rule violates the law of Monaco. In this regard, he points out that able-bodied athletes (who do not require a prosthetic) are not subject to any pre-eligibility burden to prove that they do not have any type of overall competitive advantage before they are allowed to compete. Monaco has ratified the Convention on the Rights of Persons with Disabilities ("CRPD"). Article 2 of the CRPD defines *"Discrimination on the basis of disability"* as:

> *"any distinction, exclusion or restriction on the basis of disability which has the purpose or effect of impairing or nullifying the recognition, enjoyment or exercise, on an equal basis with others, of all human rights and fundamental freedoms in the political, economic, social, cultural, civil or any other field. It includes all forms of discrimination, including denial of reasonable accommodation"*.

109. Article 30(5) of the CRPD provides that:

> *"With a view to enabling persons with disabilities to participate on an equal basis with others in recreational, leisure and sporting activities, States Parties shall take appropriate measures: (a) To encourage and promote the participation, to the fullest extent possible, of persons with disabilities in mainstream sporting activities at all levels".*

110. Mr Leeper submits that the Rule creates a *"restriction on the basis of disability"* which *"has the purpose or effect of impairing"* Mr Leeper's participation in IAAF-sanctioned athletics competitions *"on an equal basis with others"*. The IAAF has therefore violated the CRPD since it has not demonstrated any non-discriminatory basis to presume that a bilateral amputee running with passive prosthetics would have an overall competitive advantage – as opposed to disadvantage – in competing against able-bodied runners.

111. Mr Leeper submits that the Rule also violates Article 14 of the European Convention on Human Rights ("ECHR"), which Monaco ratified in 2005. This provides that:

> *"The enjoyment of the rights and freedoms set forth in this Convention shall be secured without discrimination on any ground such as sex, race, colour, language, religion, political or other opinion, national or social origin, association with a national minority, property, birth or other status".*

112. The European Court of Human Rights has held that the scope of Article 14 ECHR includes discrimination based on disability (*CAM v Turkey*, no. 51500/08). Mr Leeper notes that in *Kane v International Association of Ultrarunners* No. 2020/000012 (24 October 2019), a Monegasque court applied Article 14 of the ECHR and issued an interim order holding that the International Association of Ultrarunners had discriminated against a blind runner in applying Rule 132.3(a) of the IAAF Competition Rules to prevent her from competing in ultra-long distance events.

113. Mr Leeper submits that the Rule of the IAAF Competition Rules violates Article 14 ECHR because it prevents a disabled athlete who must use RSPs from participating in IAAF-sanctioned events (including the Olympic Games) unless they can meet the heavy and costly burden of establishing that they do not have an overall competitive advantage.

114. Furthermore, Mr Leeper submits that not only is the rule discriminatory in its *effect*, it is also discriminatory in its *intent*. By enacting the rule, the IAAF has sought to block elite bilateral amputee athletes from competing in IAAF-sanctioned events. Mr Leeper submits that the history of the IAAF's treatment of him demonstrates that discriminatory intent. Although the Rule was enacted in 2015, the IAAF permitted Mr Leeper to compete with his RSPs until late 2017. It was only after he ran an Olympic qualifying time of 44.42 seconds that the IAAF decided to apply the rule in order to bar him from competing at the highest level of elite competitive athletics. This reveals the true object and purpose of the rule.

115. In addition to allegedly contravening those international instruments, Mr Leeper further submits that the Rule also contradicts the stated purpose and intent of the IAAF's charter and the Olympic Charter, which purport to protect the rights of disabled athletes to compete.

116. Mr Leeper submits that, in any event, even if the Rule is not unlawful, he is able to establish on the balance of probabilities that his RSPs do not provide him with an overall competitive advantage. Accordingly, he must be permitted to compete. In support of that proposition, Mr Leeper relied on the content of the Grabowski Report and the Grabowski Reply Report and the further evidence from Dr Grabowski, and the expert evidence from Dr Hugh Herr.

117. Mr Leeper submits that the response to the Grabowski Report contained in the ARG Provisional Report and ARG Final Report is *"shockingly weak"*. The ARG's reports contain no positive analysis and merely criticise Dr Grabowski's findings. In this regard:

- The criticisms of the Grabowski Report of the ARG Provisional Report were premised on an erroneous comparison between the predicted times for Mr Leeper based upon tests conducted in laboratory conditions and Mr Leeper's actual times on the track. This is wrong since it is typical for all athletes (whether or not they use RSPs) to run better times in live competition than the times predicted by the results of laboratory tests. The ARG therefore gave no sound reason for rejecting the detailed and well-documented scientific evidence in the Grabowski Report, which established that Mr Leeper has no overall advantage from his use of RSPs.

- The ARG Final Report did not even attempt to explain the fundamental error in confusing actual track-based running times with laboratory-based predicted times. The failure to do this calls the ARG's neutrality and competence into doubt.

- The ARG Final Report instead came up with a *"last minute, totally new justification for disqualifying Mr Leeper"*, claiming that the magnitude of the difference between the predicted lab times and Mr Leeper's actual times in competition impugned the reliability of the conclusions in the Grabowski Report. Dr Grabowski will demonstrate that this argument is scientifically unsound and does not undermine her finding that Mr Leeper does not have any overall competitive advantage over able-bodied athletes.

- The *"shifting justifications"* of the ARG and IAAF merely confirm that there has been *"a predetermined decision to disqualify Mr Leeper regardless of the scientific merits"* which is based on *"the same prejudices against disabled athletes competing at the highest levels against able-bodied athletes that CAS found in the IAAF's response to the prospect of Mr Pistorius competing against non-disabled athletes"*.

118. Accordingly, for all these reasons Mr Leeper submits that the Panel should overturn the decision of the IAAF and permit him to compete against able-bodied athletes in all international competitions.

119. In support of his request for relief, Mr Leeper adduced the following evidence.

Mr Leeper

120. Mr Leeper provided a witness statement in support of his appeal. Mr Leeper began his statement by describing his experience of growing up as a child who was born with fibular hemimelia, a congenital birth defect which resulted in him being born without most of his calf muscles, shin bones and feet.

121. Mr Leeper received his first prosthetics when he was aged nine months. The prosthetics did not match up with his leg stumps, with the result that he experienced frequent *"bleeding, bone spurs, and pain"*. At the age of four, Mr Leeper therefore underwent amputative surgery on his feet and legs to enable his leg stumps to be attached less awkwardly to the prosthetics. The surgery involved his bones and toes being *"literally shaved down"*, and required many weeks of convalescence.

122. Mr Leeper explained that as a child growing up in Tennessee he had *"refused to give up and live a sedentary life"*, choosing instead to play in various sports, including basketball and baseball, against able-bodied children. Mr Leeper stated that he *"always tried to see myself, and be seen by others, as just another athlete and student"*.

123. In 2009, Mr Leeper participated in his first official track meeting. He ran a time of 11.8 seconds in the 100m race (his first ever race) which qualified him for the U.S. Paralympic team. Later that year he competed for the first time at international level, winning a silver medal in the 200m event and a bronze medal in the 100m event at the Loterias Caixa International Meeting for Athletics and Swimming in Rio de Janeiro, Brazil.

124. In 2010, Mr Leeper began full-time training with other US Paralympic and Olympic athletes at the Olympic Training Center in San Diego. In 2011, he began competing full-time. At a meeting in Australia he ran a time of 11.18 seconds in the 100m event, which was the fastest time in the world for a para-athlete at that date.

125. The following year Mr Leeper participated in the 2012 Paralympics where he won the silver medal in the 400m event (running a time of 50.14 seconds) and a bronze medal in the 200m event (running a time of 22.46 seconds). In 2013, he won the silver medal in the 100m, 200m and 400m events at the IPC World Championships (with times of 11.34 seconds, 21.78 seconds and 49.3 seconds respectively) and was a member of the gold medal winning 4x100m relay team.

126. In 2014, Mr Leeper took a "break" from competitive athletics for personal reasons. In 2016, he set a US record in the double-amputee (T43) 400m event, with a time of 46.10 seconds. In June 2017, Mr Leeper then broke the 400m Paralympic world record, running a time of 45.25 seconds at the 2017 USATF Outdoor Championships. Following that competition, he began regularly competing against able-bodied athletes.

127. In the first half of 2018, Mr Leeper ran the 400m in times of 45.07 seconds, 45.21 seconds and 45.37 at international events in California, Bermuda and Latvia. On 4 June 2018, he then won the 400m event at the Praha Josef Odložil Memorial meet in Prague, Czech Republic with a

time of 44.42 seconds, which at that date was the fastest 400m time ever run by a double-amputee. At around this time, Mr Leeper learned that the IAAF had notified USATF that his times at the events in California, Bermuda, Latvia and the Czech Republic had been *"red-flagged"* on the basis that he had not established that his RSPs did not give him a competitive advantage.

128. Mr Leeper described how he underwent testing by Dr Grabowski between 19 and 24 August 2018. He explained that after submitting his Application to the IAAF on 3 July 2019, the IAAF did not ask him to undergo any additional testing, to answer any questions, or to submit anything else prior to ruling on the application. On 9 July 2019, USATF informed Mr Leeper that he was permitted to compete in the 2019 USATF Outdoor Championships while his Application was pending before the IAAF. He competed in those championships against able-bodied athletes, winning his 400m semi-final heat with a time of 44.38 seconds (a new personal record and the fastest time run by a double-amputee) and finishing fifth in the 400m final. Mr Leeper's times should have made him eligible to compete at the 2019 IAAF World Championships as part of the men's 4x400m relay team. The IAAF, however, did not permit him to compete at that event, even though it had not yet determined the Application.

129. Mr Leeper explained why he disagrees with the IAAF's position that he has an overall advantage compared to able-bodied athletes in the 400m event. Far from enjoying any such advantage, Mr Leeper believes that he faces *"a substantial overall disadvantage"* compared to able-bodied athletes whose legs have not been amputated. For example:

- Mr Leeper's RSPs require him to step out of the starting blocks, rather than using muscular power in his legs and ankles to push out of the blocks as able-bodied athletes do. He therefore begins every race at an immediate disadvantage compared with his able-bodied competitors.

- That disadvantage is compounded by the fact that, since his legs have been amputated, he lacks all of the energy-providing muscular tissue which other competitors have in their legs.

- In addition to the comparative lack of muscular tissue and power, Mr Leeper's RSPs are designed for straight movement, rather than curved movement. This places him at a disadvantage when running around curves (which make up about half of the 400m race).

- In addition, the fact that he is a double-amputee means that Mr Leeper has to use alternative weight training methods, since he cannot engage in certain types of lift training that are standard training techniques for able-bodied athletes.

- Mr Leeper also experiences other physical disadvantages that are not experienced by able-bodied athletes. For example, he has to wear silicon sleeves over his stumps in order to connect the stumps to a pin that connects to his prosthetics. The sleeves are attached to the top of his legs in an airtight seal, with the result that sweat accumulates and is trapped within the sleeves during training and competition. The build-up of trapped sweat causes *"frequent infections"* on the back of Mr Leeper's legs. Those infections often cause *"severe*

> *swelling"* of his stumps and pain and discomfort, which is sometimes so significant that he cannot walk until the swelling abates. Able-bodied athletes do not experience any equivalent problems arising from the connections between their upper and lower legs.

130. Mr Leeper went on to explain why he believes it is unfair for disabled athletes to bear the burden of establishing that they do not have a competitive advantage over able-bodied athletes. In particular, most disabled athletes do not have the resources to hire scientists in order to conduct extensive testing such as that carried out by Dr Grabowski. Nor are they likely to be able (as he has done) to secure legal and scientific services.

131. Mr Leeper explained that his lifetime goal has been to compete in the Olympic Games. Achieving that goal would, he believes, both help to change perceptions of individuals with disabilities and help to inspire disabled persons not to accept lower expectations from others. Mr Leeper therefore urged the Panel to overturn the IAAF's decision, in order to give him the opportunity to realise his dream and to serve as an inspiration for other disabled athletes to do likewise.

132. At the outset of his oral testimony, Mr Leeper explained that his height when standing flat footed is between approximately 5 feet 11 inches and 6 feet. When standing on the equivalent of the tip of his toes, however, he is 6 feet and 2 inches tall.

133. In cross-examination Mr Leeper was asked a number of questions regarding the cost, features and height of the various RSPs he has used since he began competing in 2009. Mr Leeper explained that in 2011 he increased the height at which he ran by approximate three inches to 189.2 cm, which was his MASH height at the time. Mr Leeper stated that he made this change as a result of his evolving understanding of running biomechanics and in order to enable him to run at the height that was most comfortable. Following that adjustment to the height of his RSPs in 2011, Mr Leeper had not made any further changes to his running height. When he was asked why he did not return to Paralympic competition following the expiry of his anti-doping suspension, Mr Leeper candidly acknowledged that this was because he would have had to change his running height in order to comply with the new MASH rule. He added that he was comfortable running at the height he had been running at since 2011 and his musculature and gait had developed at that height. In addition, he felt that changing the height of his RSPs would present a risk of injury.

134. Mr Leeper was cross-examined about various comments he had made in the past about the possibility of using technology to enable his RSPs help him to run faster. Mr Leeper explained that he had made these comments as a young, excitable and naïve athlete, and had subsequently come to realise that athletic performance is ultimately *"all about training"*. He went on to say that he attributed the significant incremental improvements in his 400m times since 2012 to a greater understanding of running, a greater level of commitment and dedication, and years of intense training.

135. At the conclusion of the hearing, Mr Leeper delivered a closing statement. He began by providing an account of the tremendous challenges and discrimination he has faced as a disabled

African American man growing up in Tennessee and as a bilateral amputee seeking to compete against able-bodied athletes in elite competitive sport. He spoke movingly about the inspiration he felt when he saw a fellow bilateral amputee athlete, Oscar Pistorius, competing on prosthetic blades against able-bodied athletes at the 2012 Olympics. He emphasised the enormous sacrifices that he has made in striving to be the best athlete he can possibly be despite his disability. He also emphasised the deep dismay and sadness he felt as a result of his treatment by the IAAF and his shock when he was told that he could not compete with his RSPs in elite international track events. While he had expected the highest standards of inclusion from the IAAF, the IAAF had failed to show this. It was *"heart-breaking"*, he said, that, instead of seeking to be inclusive, the IAAF had used his disability to diminish his achievements and aspirations.

Willie Gault

136. Willie Gault is Mr Leeper's professional coach. Mr Gault has enjoyed a long and successful career in elite level sport. He was a member of the 1980 United States Olympic team and was part of team that broke the world record in the 4x100m relay at the 1983 IAAF World Championships. He was also a member of the United States Olympic bobsled team at the 1988 Winter Olympics. He continues to compete in world-class sprinting events. According to his statement in support of Mr Leeper's appeal, he has broken no fewer than 14 world records over a period of 35 years in various sprinting events.

137. Mr Gault took issue with the IAAF's contention that Mr Leeper is not *"naturally world class"*. Mr Gault stated that no one is *"naturally"* a world-class sprinter; rather this can only be achieved through a combination of certain physical attributes and *"incredible athletic ability and an unwavering work ethic"*. Mr Gault went on to explain that having trained alongside world class athletes such as Carl Lewis and Maurice Greene, and having trained a number of elite sprinters, he is familiar with the factors that differentiate world class sprinters from other athletes. In his experience, Mr Leeper clearly has all of the attributes that are required for a world class athlete.

138. According to Mr Gault, Mr Leeper is *"a natural athlete"* with *"first rate"* coordination and physical skill. Mr Leeper has *"elite natural coordination and agility"*, *"a gifted level of physicality"* and *"more than enough physical capacity to become a world-class sprinter"*. In addition to those innate physical talents, Mr Leeper also has *"a rate determination and capacity for physical work"* and *"an unwillingness to quit"* that Mr Gault has seen in almost all world-class athletes. Over the five years that he has coached Mr Leeper, he has witnessed Mr Leeper training tirelessly, running many hundreds of miles and undergoing comprehensive weight training.

139. Mr Gault explained that improvements in Mr Leeper's 400m performance during that time have occurred *"incrementally"* as a result of improvements to training and technique. The improvements were not caused by any changes to Mr Leeper's RSPs. Shortly after Mr Gault became his coach, and following the end of a sponsorship deal with Össur, Mr Leeper switched from RSPs manufactured by Össur to RSPs manufactured by Ottobock. Mr Leeper ran at the same height with both sets of RSPs and there was no significant change to his running times as a result of switching manufacturer. The height of Mr Leeper's RSPs has remained constant throughout the whole time that Mr Gault has been his coach. The gradual improvement in Mr

Leeper's 400m times is solely the product of dedicated training, rather than any adjustments to his RSPs.

140. Mr Gault stated that during his long career in athletics, he has never known any non-disabled athlete to have their height or limb proportions measured as a condition of competing and differences in height and body type have ever been used as the basis for disqualifying any non-amputee athletes.

141. During cross-examination Mr Gault agreed that elite 400m runners are taller than average. He stated that all other things being equal, it is better to be taller in order to be a faster 400m runner. He stressed, however, that in his view the single most important characteristic that determines 400m performance is *"work ethic"*. Mr Gault was asked whether he agreed that Mr Leeper experiences a 1.81 second disadvantage in the 400m race as a result of his RSPs. Mr Gault agreed *"absolutely"* that this was the case. He also stated that Mr Leeper enjoys no concomitant advantages from his use of RSPs. When he was asked how Mr Leeper is nonetheless able to achieve top elite 400m times, Mr Gault stated that this was because Mr Leeper trains hard, adjusts his race pattern so that he runs faster during the second half of the race and works very hard to make up the difference caused by his slower start.

142. Mr Gault confirmed that Mr Leeper has run at the same height throughout the whole time Mr Gault has been his coach. During that time, Mr Leeper's 400m times had steadily improved while he was running at the same height.

Dr Alena Grabowski, Paolo Taboga and Owen Beck

143. The contents of the Grabowski Report and the Grabowski Reply Report are respectively summarised above. In addition to those reports, Dr Grabowski, Dr Taboga and Dr Beck also produced a response dated 13 March 2020 to the ARG Final Report (the "Third Grabowski Report") and the Grabowski Response dated 11 June 2020.

144. The Third Grabowski Report began by stating that the approach of the ARG *"make*[s] *it impossible for Blake Leeper (or any other athlete with an amputation) to demonstrate that, based on the balance of probabilities, his use of prostheses would not provide him with an overall competitive advantage over an athlete not using such prostheses"*. In this regard, the ARG's observations *"imply that we would need to test elite 400 m performances pre- and post- leg amputations, with an identical twin control subject, to determine whether prostheses yield an overall advantage compared to biological legs"*. Drs Grabowski, Taboga and Beck *"are not aware of any testing protocol in a civilized country that would meet the burden imposed by the ARG"*.

145. The Third Grabowski Report went on to state that the ARG failed to provide any basis for rejecting their conclusion that Mr Leeper does not have any advantage in the acceleration phase of the 400m race. In this regard, while models based on scientific data do not perfectly predict race performance, they do provide reliable comparisons for approximate performance based on the best available data. The clear conclusion of the predictive data is that Mr Leeper is not faster than elite non-amputee sprinters during the initial 100m of the 400m race. While the ARG may question how much slower Mr Leeper is, all of the evidence indicates that he is indeed

slower than elite non-amputees. The fact that there are differences between predicted times and actual race times in competitive conditions does not show that an athlete has an advantage. Moreover, the ARG's points of distinction between the di Prampero Study and the Grabowski Report identified by the ARG are irrelevant to the validity of the comparisons drawn in the Grabowski Report:

- The country in which the studies were carried out and the date of publication have no bearing on the validity of the comparisons.

- The use of an indoor versus outdoor tack does not affect the validity of the comparisons.

- Barometric pressure and temperature do not affect the comparisons: the temperature and barometric pressure were similar in the di Prampero Study and the study of Mr Leeper.

- The equipment used to measure velocity does not affect the validity of the comparisons. In both cases, the equipment operates similarly and is reliable.

146. Furthermore, the Third Grabowski Report explained that:

- The di Prampero Study had measured the fastest forward acceleration achieved by 12 medium-level non-amputee sprinters 0.2 seconds after the start. Mr Leeper's maximum acceleration (3.60 m/s^2) during the trials conducted by Dr Grabowski and her colleagues was 43.9% (4.6 standard deviations) slower than the average maximum acceleration of the non-amputee sprinters (6.42 m/s^2) in the di Prampero Study.

- Based on the data concerning Mr Leeper's maximum acceleration and maximum velocity, the Grabowski Report used a validated model (which was not created by the authors of the Grabowski Report) to compute how long it would take Mr Leeper and the medium-level non-amputee sprinters to run the first 100m of a 400m race. This showed that Mr Leeper is 1.41 seconds slower than the medium-level non-amputee sprinters during that portion of the race.

- The comparison in the Grabowski Report between Mr Leeper and medium-level non-amputee sprinters is relevant because Mr Leeper's acceleration was *worse* than medium-level non-amputee sprinters, who are slower than elite non-amputee sprinters. Accordingly, it is likely that Mr Leeper would be *even slower* compared to elite non-amputee sprinters.

- This conclusion is reinforced by the fact that Mr Leeper's horizontal acceleration and velocity exiting the starting blocks were 30% (*i.e.* more than five standard deviations) and 32% (*i.e.* more than 14 standard deviations) slower than those of elite non-amputee sprinters reported by Rabita G. *et al.* ("the Rabita Paper")[6].

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6 RABITA G., DOREL S., SLAWINSKI J., SAEZ-DE-VILLARREAL E., COUTURIER A., SAMOZINO P. *et al. Sprint mechanics in world-class athletes: a new insight into the limits of human locomotion*. Scandinavian journal of medicine & science in sports. 2015;25(5):583-94.

147. In the view of Drs Grabowski, Taboga and Beck, the ARG appears to require Mr Leeper to definitively explain all of his *"sources of performance"*. However, this would be an *"impossible task"* since there are *"numerous assumptions and unknowns"* that cannot be humanely tested to assess the mechanics that affect performance over 400m. The data, models, estimates and experiments conducted by the authors of the Grabowski Report *"all demonstrate that Mr Leeper does not yield a single performance metric that is advantageous compared to non-amputees"*.

148. The Third Grabowski Report stated that the ARG had not provided any basis for rejecting the conclusion that Mr Leeper does not have any advantage during the curve phase of the 400m race. In this regard, the ARG consistently confuses race splits and lab tests. This is significant, since due to confounding variables race splits cannot be used to determine maximum curve running speed. By controlling for those confounding variables, the authors had established that Mr Leeper slowed by 6% on the curve, which was double the 3% reduction in speed of the non-amputee sprinters. This shows that Mr Leeper will indeed decelerate more on curves than non-amputee sprinters.

149. The Third Grabowski Report stated that it was *"notable"* that the ARG had not provided any feedback or criticism of the results of the study of Mr Leeper's maximum velocity, sprinting endurance and velocity at maximum aerobic capacity. All of those data – which appear to be uncontested – support the conclusion that Mr Leeper does not have an overall advantage.

150. The Third Grabowski Report ended by reiterating that:

> *"[W]e performed scientifically rigorous testing protocols with Mr Leeper to determine whether or not his prosthetic legs provide him an advantage over non-amputees. We performed more tests, collected more data, and made more comparisons than those performed for Oscar Pistorius, and our testing methods and results were reviewed and approved by the same eminent scientists who submitted test data and testified in the* [CAS 2008/A/1480] *case. In our testing, we showed that Mr Leeper does not: 1) accelerate faster than non-amputees at the start of the race, 2) achieve faster maximum sprint velocities than non-amputees, 3) run around a curve as fast as non-amputees, 4) have a running velocity at maximum aerobic capacity that is faster than non-amputees, and 5) exhibit superior printing endurance compared to non-amputees. Hence, based on all of the tests we performed and data we collected, which all show that Mr Leeper does not exhibit superior performance metrics versus non- amputees, we reiterate that this establishes on the balance of probabilities that Mr Leeper's use of prostheses does not provide him with an overall competitive advantage over an athlete who is not disabled. If this rigorous scientific evidence is not found to be sufficient to meet the burden of probabilities, then we are unable to envision that any person with an amputation will ever be permitted to compete against non-amputee athletes in elite running competitions as the ARG's positions make it impossible for any disabled athlete to meet their non-scientific demands"*.

151. In the Grabowski Response dated 11 June 2020, Dr Grabowski explained why she and her co-authors remained of the opinion that Mr Leeper's RSPs do not provide him with an overall competitive advantage.

152. In respect of Mr Leeper's initial acceleration, the Grabowski Response stated that:

- Contrary to the claim of Drs Weyand and Bundle, the raw data concerning the average ground reaction forces of the non-amputee athletes in the Grabowski Report is correct and representative.

- The IAAF's experts are wrong to assert that the acceleration phase of the 400m race has little or no predictive validity for overall 400m performance. Many studies have shown strong correlations between high mean horizontal forces during acceleration and sprint performance over distances between 100m and 400m. Harland & Steele, for instance, state that, *"In the 100, 200 and 400m track sprints, the start is an important and crucial skill to be learned if a sprinter is to maximise performance over the race distance".*

- The IAAF's assertion that Mr Leeper saves energy by virtue of his slower start, which he is then able to deploy at a later stage of the 400m race, is illogical since Mr Leeper's inferior starting performance means that in order to achieve the same time as his non-amputee competitors, he has to accelerate for a longer period and achieve a faster steady-state velocity – both of which require more metabolic energy. Moreover, Mr Leeper's curve running performance shows that he fatigues in the same way as non-amputee runners.

- In respect of Mr Leeper's running height, Dr Grabowski points out that whereas non-amputee athletes are able to change the length of their lower leg by plantarflexing (rotating the biological ankle such that the forefoot moves downwardly away from a runner's knee, increasing the effective length of the biological lower leg), Mr Leeper cannot do this. Accordingly, non-amputees can change the length of their lower leg and generate positive mechanical power by actively changing their ankle length during initial acceleration, whereas Mr Leeper cannot.

- In addition, passive RSPs cannot generate the high mechanical torque and power that can be achieved by muscles and tendons in a biological ankle. Mr Leeper has no calf muscles and therefore he has to use muscles at the knee and hip joints to generate power. This is likely to account for his slower acceleration.

153. In respect of Mr Leeper's running biomechanics and maximum velocity, the Grabowski Response stated:

- The IAAF's claim that Mr Leeper's 400m time would be eight seconds slower if his limbs were 92cm rather than 107cm is *"an overly simplistic guess".*

- Mr Leeper's maximum velocity that was similar to, but not faster than, the maximum velocity of non-amputee sprinters. He also had *"nearly identical"* running mechanics to those athletes. Accordingly, his RSPs do not give him an unfair advantage, in terms of maximum running velocity, over athletes without RSPs.

- Mr Leeper's height and limp proportions cannot be an advantage over able bodied 400m sprinters because *"there are no requirements that limit the height or limb proportions of non-amputee athletes, many of whom run as tall or taller than* [Mr] *Leeper"*.

- The IAAF experts' conclusion that Mr Leeper runs faster than he would *"naturally"* run is based on an assumption of how tall Mr Leeper would be if he had complete biological legs. However, no one knows how tall he would be in that scenario, since his legs were amputated when he was an infant.

- It is not possible to use the MASH rules as a valid indicator of whether Mr Leeper was running at his *"normal"* height without knowing whether the measurements that led to the determination of a *"normal"* height under those rules were done on a proper sample population. Moreover, it would also be necessary to establish that the limb measurements under the limb rules logically relate to a determination of what the "missing" limb would have been (*e.g.* whether there is any natural correlation between one limb measurement and another).

- The IAAF's experts are wrong to state that leg length affects maximum running velocity. The Beck Paper and research conducted by Dr Taboga P. (with Drs Beck O. N. and Grabowski A. M.) the results of which were published in 2020 (the "Taboga 2020 Paper")[7] show that taller RSPs do not improve maximum running velocity. Increases in the height of RSPs do not increase ground contact length and running velocity because there are other biomechanical compensations (*e.g.* step frequency) that change with velocity.

- Taller RSPs may impair initial acceleration and do not affect running velocity at aerobic capacity or sprint endurance. Because active muscles consume oxygen and changing prosthetic height does not affect either total muscle volume or the ability of muscle to consume oxygen, changes in prosthetic height do not affect running economy or aerobic capacity.

- The Taboga 2020 Paper shows that prosthetic height does not affect maximum running velocity. The IAAF wrongly states that the paper only looked at increases in height between 2 – 4 cm. In fact, the authors measured maximum running velocity of five bilateral amputee athletes. While most of those athletes ran using RSPs with height changes of ±2cm, the overall changes in prosthetic height were -5cm to +14cm compared to the MASH. The Taboga 2020 Paper established that prosthetic height had no effect on maximum running velocity. In this regard, it is notable that the athlete with the tallest RSPs ran slower at the increased height. Similarly, the athlete with the shorter RSPs was able to achieve the same maximum velocity with a 3cm decrease in height compared to his MASH.

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7 TABOGA P., BECK O. N. AND GRABOWSKI A. M., *Prosthetic shape, but not stiffness or height, affects the maximum speed of sprinters with bilateral transtibial amputations*. PLOS One. 2020; 15(2): e0229035

- The IAAF's statement that the raw data published with the study show that increasing height by 2cm – 4cm increases maximum speed by 0.75-1.0 m/s is flawed. In particular, it is only based on a subset of the data; analysis of all the data shows no correlation between prosthetic height and running speed.

- The MASH rules are not appropriate to regulate the height of athletes with bilateral RSPs:

    - First, the MASH are used to guess the height of barefoot non-amputees. The IAAF permits such athletes to wear footwear which has a midsole up to 4cm thick. Accordingly, the IAAF permits non-amputee athletes to have a 4cm taller standing height than athletes with bilateral RSPs who comply with the MASH rules (which do not incorporate the extra 4cm to include footwear height).

    - Second, it is logical to measure an athlete's running height, rather than their standing height. Accordingly, Dr Grabowski and her colleagues sought to determine Mr Leeper's *"biological running height"* by using reflective markers to compare and measure the leg length during running of Mr Leeper and nine non-amputee athletes at particular velocities. They then normalised each athlete's running leg length to their thigh length. Mr Leeper's running leg length to thigh length ratio was within two standard deviations of the mean at 8 m/s and within one standard deviation of the mean at 9 m/s and was *"well within the range exhibited by non-amputees at touch down, mid-stance, and toe-off"* at those velocities.

154. In respect of curve running, the Grabowski Response rejected the suggestion that the data obtained from the tests on Mr Leeper are invalid because of the risk that Mr Leeper failed to use maximum effort during the trials. Dr Grabowski and her colleagues had told Mr Leeper to run as fast as possible and did not provide him with any feedback in terms of his running times or velocities. The IAAF's suggestion that Mr Leeper was somehow able to calibrate his running speed so that he maintained a speed that was between 2% and 3% slower than the speed predicted by Greene P. R. for each curve is untenable. Further, the IAAF's comparison between Mr Leeper's split times from a single race in 2018 with the split times of other competitors in a different race is not a valid basis for assessing the effect of RSPs on curve running performance.

155. The Grabowski Response concluded by reiterating that Dr Grabowski and her colleagues had made no errors in the reporting of the data and had been transparent in sharing the data, citations and rationale. Dr Grabowski and her colleagues stood by the conclusions set out in their reports.

Dr Hugh Herr

156. Dr Hugh Herr is a professor of media arts and sciences at the Massachusetts Institute of Technology ("MIT") Media Lab, where he is co-director of the MIT Center for Extreme Bionics. He is a specialist in the fields of biomechanics and biological motion control.

157. In his written statement, Dr Herr explained that he has created bionic limbs that emulate the function of natural limbs, and has pioneered the development of active leg exoskeletons, powered ankle-foot prostheses and neural interfacing technologies. He has developed extensive expertise in this area and testified on behalf of the athlete in CAS 2008/A/1480.

158. Dr Herr explained that he had been instructed to review and evaluate the Grabowski Report. He began by confirming that he was not involved in the design or conduct of that study. He went on to explain that the 400m race has *"three biomechanically distinct subsections"*, namely (a) the acceleration over the initial portion of the race; (b) steady-state running around a curved track; and (c) steady-state running on a straight line. The Grabowski Report investigated all three of those subsections.

159. In respect of the Grabowski Report's analysis of the acceleration over the initial portion of the race, Dr Herr stated:

- The Grabowski Report had used force plate starting block measurements and radar measurements. These constitute *"current state-of-the-art methods to measure biomechanical force, acceleration and speed"*. In Dr Herr's opinion, these scientific methods *"would withstanding a rigorous scientific review by other experts"* in the field of biomechanics.

- The data and analysis in the Grabowski Report support the authors' hypotheses that Mr Leeper would apply lower horizontal forces to the starting blocks, and that his subsequent acceleration would be slower, compared to non-amputee athletes. In view of the measurement devices used and the analyses performed by the authors of the Grabowski Report, Dr Herr concluded that *"these data are valid, and indeed strongly support the researchers' starting hypotheses"*.

- The reasons underlying these results may be elucidated further. The scientific evidence indicates that Mr Leeper's relatively lower forces and accelerations are caused by *"limitations imposed by the RSP's mechanical design"*, which is *"a passive and human-powered device" with "no computational intelligence, no sensors, and no muscle-like actuators"*. The lower portion of an intact biological leg is powered through skeletal muscle-tendons that span the ankle-foot and knee complex, which are controlled by the central nervous system and *"enable the biological lower leg to exhibit biomechanical behaviors not possible by a passive ankle-foot prosthesis"*. Accordingly, a biological ankle under the control of the central nervous system can exert a degree of power that *"far exceeds"* the power that can be applied by a passive ankle-foot prosthesis. In Dr Herr's view, the Grabowski Report's funding that Mr Leeper exhibits significantly lower horizontal forces and acceleration is *"unremarkable, and entirely consistent with the mechanical limitations of the passive-elastic RSP compared to the muscle-tendon powered biological lower leg"*.

- Moreover, a previous study by Taboga P. *et al.*[8] (the "Taboga 2013 Paper") provided direct empirical evidence of the mechanical limitations imposed by Mr Leeper's RSPs. The

[8] TABOGA P. *et al.*, Optimal Starting Block Configuration in Sprint Running; A Comparison of Biological and Prosthetic Legs. *J Appl Biomech*, 2013.

authors of that study measured forces exerted on the starting blocks by recreational non-amputee athletes and athletes with unilateral transtibial amputations. The study found that athletes with only one prosthetic leg exerted 13% less and 29% less average horizontal force on the front block and back block respectively compared to the force exerted by their intact leg. Since this study was carried out on individuals with only one amputated leg it enabled the subjects to serve as their own experimental control (*i.e.* it enabled the authors directly to measure and compare the strength of each individual's biological leg with their prosthetic leg). The findings of this study provide *"strong evidence"* that the lower forces and accelerations seen in individuals with transtibial amputations are likely to be the result of *"fundamental limitations imposed by the passive RSP"*, rather than limited athleticism.

160. In respect of the Grabowski Report's analysis of Mr Leeper's curve running, Dr Herr stated:

- The methods used to test the authors' hypotheses that Mr Leeper's curve-running velocity would be slower due to lower ground reaction forces and longer ground contact times were *"state-of-the-art methods"* and the techniques and analyses were *"sound and would withstand a rigorous scientific review by other experts operating within the field of running biomechanics"*.

- The factor that determines peak curve-running speed is the force-generating capacity of the inside leg. It follows that if a prosthetic limb causes a leg force disability, then an athlete with a unilateral transtibial amputation who runs with their prosthetic leg on the inside (rather than the outside) of the curve would run more slowly than if they ran in the opposite direction around the track with their unaffected biological leg on the inside of the curve. Research on athletes with such amputations has indeed shown that they run 3.9% slower when running with their prosthetic leg on the inside of the curve compared to when running in the opposite direction with their biological leg on the inside of the curve.

- Since Mr Leeper is a bilateral transtibial amputee, his inside leg is always a prosthetic leg. As a result, the findings contained in the Grabowski Report – namely that Mr Leeper was 3.3% slower when running on the inside lane of a curve compared with non-amputee athletes with the same straight-running maximum velocity – are *"completely expected"*.

- Dr Herr agreed with the Grabowski Report that Mr Leeper's relatively slower curve-running speeds were due to RSP design limitations for curve running, rather than any inherent limitation in Mr Leeper's athleticism. In short, the evidence *"suggests RSP design flaws cause the 3.3% slower speed"*.

- Dr Herr went on to explain that the RSP is *"a carbon composite leaf spring in the shape of the letter J"*. During straight-line running, the spring functions in the way in which it is designed to. During curve running, however, the centripetal force causes the ground reaction forces to be directed *"somewhat inwardly towards the center of the track's curvature"*. This, in turn, causes the runner's inside leg to be angled inward. The resultant inside leg posture causes the RSP *"to strike the ground on the outside edge of the spring, causing the base of the*

J-spring to twist in torsion". As a result, the spring *"compresses to a lesser degree along its longitudinal axis"*, meaning that less energy is stored during the compression, and therefore the spring exerts lower vertical forces upon the ground surface than are exerted in straight-line running. Accordingly, Dr Herr considered that Mr Leeper's 3.3% slower velocity during curve running *"is caused by off-axis loading of the J- shaped RSP during the inside-leg stance period, causing a reduction in overall J- spring compression and force applied to the running surface"*.

161. In respect of the Grabowski Report's analysis of Mr Leeper's straight-line running, Dr Herr stated:

- The Grabowski Report had used *"state-of-the art methods"* to evaluate the authors' hypotheses regarding Mr Leeper's maximum sprint velocity, running economy, aerobic capacity, vVO2max and sprint endurance. The experimental equipment, data collections and data analyses are *"sound and would withstanding a rigorous scientific review by other experts operating within the fields of running biomechanics and physiology"*.

- Dr Herr noted that the authors of the Grabowski Report had hypothesised that Mr Leeper would exhibit distinct biomechanics during straight-line sprinting compared with non-amputee athletes. The data, however, did not support that hypothesis. Dr Herr described this result as *"extraordinary"* because *"it suggests that if researchers were blindfolded and measured these same biomechanical metrics on a group of elite 400m sprint athletes, they would not be able to distinguish between the athlete with artificial limbs (Leeper) and the athletes with intact biological limbs"*. This *"underscores just how closely the biological ankle-foot complex exhibits a spring-like response at sprint speeds similar to Leeper's RSP"*.

- Mr Leeper's sprint biomechanics were found to be distinct from those of Oscar Pistorius. According to Dr Herr, Mr Leeper's biomechanics *"may be closer to those of non-amputees because he generally uses taller and more compliant RSPs compared to various other athletes with bilateral transtibial amputations"*. By using relatively longer RSPSs with *"more compliance compared with RSPs"*, Mr Leeper's sprint biomechanics *"were effectively made similar to those of non-amputee spring athletes"*.

- However, the fact that Mr Leeper's RSPs are longer and more compliant than Mr Pistorius's RSPs is not the cause of Mr Leeper's higher maximum sprinting speed compared to Mr Pistorius's maximum speed. In particular, RSP design and differences of length and speed do not affect maximum sprinting speed for any particular athlete. This was confirmed by the study conducted by Taboga P. *et al.* in the Taboga 2020 Paper. Accordingly, the scientific evidence suggests that Mr Leeper's faster sprinting speeds compared with Mr Pistorius are the product of Mr Leeper's athleticism, rather than the length or stiffness of his RSPs.

- The Grabowski Report's results do not support the authors' hypotheses that Mr Leeper exhibits similar running economy, aerobic capacity and vVo2 max compared to non-amputee 400m sprinters. In this regard, Mr Leeper's running economy was 20% better

than the non-amputee sprinters; however, his aerobic capacity was 28% worse. Further, Mr Leeper's vVo2 max was 12% slower than the non-amputee sprinters.

- Mr Leeper's sprint endurance was *"statistically the same as that of the non-amputee athlete cohort"*. This is a *"remarkable result"* and *"suggests that if researchers were blindfolded and measured the same sprinting biomechanics as Grabowski et al. as well as the rate of fatigue while sprinting on a group of elite 400m athletes, they would not be able to distinguish between the athlete with artificial limbs (Leeper) and the athletes with intact biological limbs"*. In Dr Herr's opinion, if Mr Leeper's RSPs conferred an advantage for straight-line sprinting then either his biomechanics and/or rate of fatigue would be distinct. However, since there were *"no distinguishing features"* in respect of either of these, *"the data indicate that* [Mr] *Leeper's RSPs do not confer an advantage for straight-line sprinting compared to sprint athletes with intact biological limbs"*.

162. Dr Herr next addressed the ARG Final Report. He stated that in his opinion *"none of the ARG's criticisms* [of the Grabowski Report] *is scientifically valid"*. He began by expressing agreement with Dr Grabowski's observation that the ARG's approach makes it impossible for any athlete with an amputation to demonstrate that, based on the balance of probabilities, their use of prostheses would not provide them with an overall competitive advantage over an athlete not using such prostheses, *"because the ARG implies that a person conducting a test would need to test elite 400m performances pre- and post-leg amputations, with an identical twin control subject, to determine whether prostheses yield an overall advantage compared to biological legs"*. Dr Herr stated that while it would be *"theoretically (…) preferable"* to conduct a study in which an amputee serves as their own control, this *"is not possible nor ethical"*. In these circumstances, *"it is standard scientific practice to recruit a control cohort matched to the experimental subject(s)"*.

163. Dr Herr went on to explain why he concurred entirely with Dr Grabowski's reasons for stating that the ARG Final Report was wrong to reject her conclusion that Mr Leeper had no advantage during the acceleration phase of the 400m event. Dr Herr added that:

- The RSP is *"a solid mechanism, devoid of computational intelligence, devoid of muscles or motors and devoid of sensors"* and is only capable of releasing an amount of energy that is less than the energy put into it. In contrast, the biological ankle-foot complex *"comprises neurally-controlled muscles that can adapt their position, stiffness, damping, torque and power depending on the state of the body and its environment"*. During the acceleration portion of the 400m event, ankle power is *"critically important"*. A biological ankle can exert joint power that *"far exceeds"* the power than can be applied by a passive prosthesis. Mr Leeper's lower forces and accelerations observed in the Grabowski Report are *"consistent with the many technological limitations imposed by the RSP technology"*.

- Dr Herr reviewed all of the raw data collected by Dr Grabowski's team. Those data are *"by all indications (…) scientifically sound"* and there is no reason to question the data collected, the data collection methodologies employed, the experience and skill of the persons who collected the data, or the reliability of the data. In this regard, Dr Grabowski is *"an eminent researcher in this area"* and Dr Herr has no reason to question the reliability of her work or the reasonableness of her conclusions. In contrast, the scientific advisors to

the ARG *"are not well known"* and there is *"no question that Dr Grabowski and her team have a deeper understanding of the scientific issues involved in the testing of prostheses"*.

- Dr Herr took particular issue with the ARG Final Report's statement that *"simple comparisons of performance metrics do not explain what the source(s) of those performances are"*. In Dr Herr's view, this statement *"reflects a fundamental misunderstanding of how prostheses interact with the human body and the physical world in the course of running"* and how prostheses can be tested in comparison to the performance of non-amputee athletes. It is not scientifically possible to test all *"sources of performance"* of prostheses, and indeed the ARG's expression *"sources of performance"* is *"not even a scientifically valid criterion"*.

- Prostheses are *"complex mechanisms"*. However, Mr Leeper's RSPs are *"wholly passive in nature"* and *"do not add any net mechanical energy in their operation from any external energy source"*. Unlike a biological limb, which engages in metabolism during a race and adds energy by changing chemical energy into kinetic energy through the movement of muscular tissue, a passive prosthesis *"does not add any net mechanical energy that may aid a runner in the course of a race"*. Moreover, a human limb *"interacts in a complex manner through its various constituent parts"*, which involves *"many different muscles in different locations together with the body's skeletal framework"*, and which delivers kinetic energy not just in one particular direction, but in a multiplicity of ways. Accordingly, the *"sources of performance"* of the human body are not fully known, and the concept of *"sources of performance"* is not generally used by researchers since this *"would be a gross simplification of the activity of a human body while running in the real world"*.

- Attributes of passive prostheses *"yield disadvantages compared to the operation of the human body"*. These include disadvantages in the interaction between passive prostheses and starting blocks, the effect of lateral forces while curve-running, and *"many other factors"*. Accordingly, in order to evaluate the use of prostheses in a particular event, one should attempt to measure various performance attributes to the extent that is ethically and scientifically possible. The Grabowski Report properly assessed data from different phases of a 400m race and established that there was no overall advantage arising from the use of passive prostheses.

- Dr Herr stated that the ARG's criticisms based on comparisons with Mr Leeper's personal predicted times was *"confounding"*. According to Dr Herr, any researcher *"with even a basic knowledge in this field"* knows that times achieved on the track are often better than predicted times based on laboratory data, as a result of different variables in real world competition (*e.g.* weather and the effect of interactions with other competitors). The ARG's criticisms are *"unsupported speculations rather than grounded on any valid scientific basis"*.

- On a general note, Dr Herr stated that the ARG's criticisms of the Grabowski Report *"misconceive the entire approach"* to testing the performance of athletes who use prostheses. No disabled runner would ever be able to explain all *"sources of performance"* of their prostheses. The Grabowski Report *"adheres to the testing designs and methods generally accepted*

> *in the scientific community to assess the performance of prostheses"* and compares data collected with similar studies conducted by other researchers. The study on Mr Leeper is *"a noteworthy addition to this field of research"*, while the ARG's criticisms *"are often disconnected from science and are not a valid basis to criticize Dr Grabowski's conclusion that* [Mr] *Leeper does not have an overall advantage"*.

164. Dr Herr concurred with Dr Grabowski's conclusion that Mr Leeper does not have any advantage during the curve phase of the 400m race. In this regard, the ARG *"appears to make the basic mistake of confusing race splits and lab tests"*. Dr Herr restated his earlier explanation about why RSPs reduce the maximum speed for curve-running.

165. Dr Herr also endorsed Dr Grabowski's observation that the ARG Final Report did not contain any feedback or criticism concerning the analysis of Mr Leeper's maximum velocity, sprinting endurance or velocity at maximum aerobic capacity. In Dr Herr's view, those data support the conclusion that Mr Leeper does not have an overall advantage in the 400m event compared to non-disabled athletes.

166. Lastly, Dr Herr explained why he considers the MASH rules irrelevant. The MASH rules have not been adopted by the IAAF and were not applied to Mr Leeper's Application. Instead, the MASH rules have been adopted by federations that organise events in which disabled athletes compete against other disabled athletes, and not to events in which disabled athletes compete against non-disabled athletes. Accordingly, the IAAF's reference to the MASH rules was *"an apples-to-oranges comparison"* since the considerations that apply when comparing disabled athletes to other disabled athletes are *"wholly different"* to the considerations that apply when comparing the performance of disabled athletes and able-bodied athletes. Furthermore, any assessment of the advantage for an athlete using prostheses must be done on an event-by-event basis, since the disadvantages presented by prostheses may vary between different events.

167. Dr Herr added that in his view the MASH rules do not have any scientific validity in their application to the particular facts of Mr Leeper's performance in the 400m event. In particular, the MASH rules are founded on the premise that the human body has a *"normal"* range of proportions for the lower extremity compared to an athlete's overall height and body dimensions. This premise is *"highly controversial in the scientific community"* and there is no settled view as to its correctness. The supposition of what constitutes *"normal"* bodily proportions is *"very subjective"*. Able-bodied athletes (including able-bodied 400m runners who are taller than Mr Leeper) participate in events without any assessment of whether their limb proportions or height are within or outside of *"normal"* ranges. This reflects the fact that there is *"no scientific evidence"* that an able-bodied athlete with longer limbs or greater height has any kind of competitive advantage in the 400m event.

168. There is a common misconception that increasing RSPs length, and therefore the standing height of the bilateral amputee using the RSPs, will increasing the athlete's maximum sprinting speed. The scientific evidence, however, *"stands contrary to such a claim" and "does not support the conclusion that longer RSP lengths increase maximum sprinting speed"*. By way of example, in the Taboga P. *et al.* study RSP heights were increased or decreased by 0.02m in order to determine the

relationship between RSP height and the maximum sprint speed of five bilateral transtibial athletes. The study found that the height of the RSPs had no effect on maximum sprint speed. In any event, even if RSP lengths did increase the sprinting speed of bilateral amputees in some circumstances, the MASH rules would remain irrelevant to the question of whether Mr Leeper's performance using his RSPs in the 400m event, with its own unique characteristics, give him an overall advantage compared to non-amputee athletes. In Dr Herr's professional opinion, the Grabowski Report shows no such advantage, and the MASH rules *"do not disclose any scientific basis to question that conclusion"*.

Relief claimed by Mr Leeper

169. In his statement of claim, Mr Leeper sought the following relief:

> *"For all of the reasons set forth herein, Mr Leeper respectfully requests that this panel reverse the IAAF's denial of his Application and find him eligible to compete in all IAAF- sanctioned events using his RSPs such that his results are listed alongside those of able-bodied athletes, and so that, if he achieves the necessary qualifying times, he will be eligible to participate in the Olympics and other World Athletics Series competitions going forward".*

170. Following the conclusion of the hearing, Mr Leeper submitted an amended request for relief, which provides as follows:

> *"For all of the reasons set forth herein, Mr Leeper respectfully requests that this panel reverse the IAAF's denial of his Application and rule that:*
>
> *A. The requirement in IAAF Technical Rule 6.3.4 (former IAAF Competition Rule 144.3(d)) that Mr Leeper satisfy the burden of proof:*
>
> *(1) is an unlawful discrimination as applied to disabled persons, and is therefore invalid and unenforceable as applied to Mr Leeper; and*
>
> *(2) Mr Leeper is therefore eligible to qualify for and compete using his current Ottobock 1E90 Sprinter prosthetics, with his results treated no differently than those of able-bodied athletes, in all IAAF-sanctioned 400 meter events, including World Athletics Series competitions and the Olympics Games;*
>
> *B. In the alternative, should the Tribunal not find that the burden of proof is an unlawful discrimination as applied to disabled persons and therefore invalid and unenforceable with respect to Mr Leeper:*
>
> *(1) Mr Leeper has proven, on the balance of probabilities under IAAF Technical Rule 6.3.4, that the use of his current Ottobock 1E90 Sprinter prosthetics in the 400m event does not provide him with an overall competitive advantage over an athlete not using such prosthetics, and*

(2) *Mr Leeper is therefore eligible to qualify for and compete using his current Ottobock 1E90 Sprinter prosthetics, with his results treated no differently than those of able-bodied athletes, in all IAAF-sanctioned 400 meter events, including World Athletics Series competitions and the Olympics Games;*

C. *In the alternative, should the Tribunal determine that it can strike out or otherwise amend the language in Technical Rule 6.3.4 to put the burden of proof on the IAAF, the IAAF has not met its burden to prove that Mr Leeper's use of his current Ottobock 1E90 Sprinter prosthetics in the 400 meter event provides him with an overall competitive advantage over an athlete not using such prosthetics, and Mr Leeper is therefore eligible to qualify for and compete using his Ottobock 1 E90 Sprinter prosthetics, with his results treated no differently than those of able-bodied athletes, in all IAAF-sanctioned 400 meter events, including World Athletics Series competitions and the Olympics Games.*

D. *The IAAF may not apply IAAF Technical Rule 6.3.3 (formerly IAAF Competition Rule 144.3(c)), or any other current IAAF rule applicable to the use of prosthetics by disabled athletes in competitions, to preclude Mr Leeper from qualifying for and competing using his current Ottobock 1E90 Sprinter prosthetics, with his results treated no differently than those of able-bodied athletes, in all IAAF-sanctioned 400 meter events, including World Athletics Series competitions and the Olympics Games;*

E. *The IAAF shall pay the arbitration costs of Mr Leeper falling within CAS Code Article R64.4".*

B. The IAAF

171. The IAAF's submissions may be summarised as follows:

172. The IAAF submits that it is entitled to require Mr Leeper to prove, as a condition of being exempted from the usual prohibition on mechanical aids, that his times in the 400m event are achieved solely through his natural athletic ability, and not by an artificial advantage derived from his specially-designed RSPs.

173. The IAAF contends that it is entitled to place the burden of establishing this on Mr Leeper. In particular, the ban on mechanical aids exists in order to protect the integrity of sport, by ensuring that the outcome of competitive athletics is determined by natural talent and effort, rather than technology. As a basic principle, it is right to require the person who seeks an exception to that rule to establish that the exception sought will not threaten that integrity. It is said that this approach is supported by the *"precautionary principle"*, which holds that where there is any doubt as to whether a particular set of facts confers an unfair advantage, the doubt must be resolved against the athlete who seeks to participate on the basis of those facts.

174. The IAAF contends that the fact that an athlete has a disability does not affect this basic analysis. There is no legal authority that makes it unlawful to place the burden of proof on a disabled athlete. On the contrary, it is established under anti-discrimination laws that where a person with a disability seeks an exception to the usual arrangements in order to accommodate their disability, they must establish that the accommodation sought is reasonable.

175. The CAS jurisprudence clearly establishes that there is no absolute right to participate in elite sport. Rather, the governing body of a sport may impose strict eligibility conditions on the right to participate, in order to protect the sport's legitimate objectives. It has been repeatedly held that the objective of preserving a level playing field, so that the outcome of competition is based solely on participants' talent, dedication and hard work, is a legitimate objective for these purposes. The IAAF cites a number of examples of eligibility rules that are designed to achieve this outcome and whose validity is well-established:

- Competitive athletics is divided into male and female categories to achieve fairness. The purpose of this eligibility restriction is to remove the competitive advantage that such athletes derive from their male levels of testosterone over athletes with female levels of testosterone.

- Competitive athletics is divided into age categories to ensure fairness. For instance, the IAAF holds an under-20 World Championships. Athletes who wish to compete in this age-restricted event must prove their age in order to do so.

- All athletes are required to submit to drug testing upon demand, in order to prove that they are not acquiring an unfair performance advantage by doping.

- Athletes who need to use a prohibited substance in order to treat a medical condition must apply for and obtain a *"therapeutic use exemption"* ("TUE"). Under paragraph 10 of the World Anti-Doping Agency's International Standard for Therapeutic Use Exemptions (which is incorporated by reference into the IAAF Anti-Doping Regulations), athletes seeking a TUE must prove, on a balance of probabilities, that the drug they wish to take *"is highly unlikely to produce any additional enhancement of performance beyond what might be anticipated by a return to the Athlete's normal state of health following the treatment of the acute or chronic medical condition"*. No CAS Panel has ever suggested that it is unlawful to place that burden on the athlete seeking a TUE.

- There is a longstanding prohibition on the use of any equipment or other form of assistance during competition (subject to narrow exceptions). In this regard, athletes must be able to prove that their running shoes do not confer *"any unfair assistance or advantage"*. Once again, it has never been suggested that it is unlawful to place the burden on the athlete in this way.

176. The IAAF submits that both civil and common law systems have recognised that sports governing bodies enjoy a significant margin of appreciation in determining what measures are necessary and proportionate to achieve their sporting objectives. In this regard, the IAAF's decision to place the burden on the athlete who wishes to use a mechanical aid to prove that they do not receive an overall competitive advantage compared with athletes not using such an aid falls squarely within the IAAF's margin of appreciation. In particular:

- Mr Leeper is seeking an exception to be made to the normal eligibility rule. It is fair to require him to prove, in case of doubt, that granting the exception sought will not undermine the objectives on which that rule is based. This is particularly so where (as here) there are good reasons to believe that specially-designed RSPs may confer an artificial advantage on the user.

- The law is clear that if there is any doubt about whether a particular circumstance does or does not undermine the integrity of the sport, the governing body is entitled to place the burden on the athlete to prove that the integrity of the sport is not so undermined.

- A governing body is entitled to go further and to *"foreclose debate"* on an issue on the basis of the precautionary principle.

- Moreover, the athlete seeking to use the mechanical aid controls access to, and is best able to gather and explain, the evidence relevant to the advantages and disadvantages they derive from the use of the mechanical aid. This is a further reason why it is reasonable to place the burden of proof upon the athlete.

177. In its Answer, the IAAF charted the history of the rules regulating the use of mechanical running aids. In 2007, the IAAF enacted a specific prohibition of *"any technical device that incorporates springs, wheels or any other element that provides the user with an advantage over another athlete not using such a device"*. In 2008, Oscar Pistorius, a bilateral transtibial amputee, sought permission to compete in IAAF competitions using "Cheetah Flex-Foot" prosthetic blades manufactured by Össur. In response to that request, the IAAF commissioned a study which found that those blades provided *"significant biomechanical advantages"* over biological limbs. In light of this finding, the IAAF refused Mr Pistorius's application. Mr Pistorius then challenged that refusal before the CAS.

178. In CAS 2008/A/1480, the CAS Panel held that the rule in force at the time meant that, *"If the use of the device provides more disadvantages than advantages, then it cannot reasonably be said to provide an advantage over other athletes, because the user is actually at a competitive disadvantage. This is the only sensible reading of the terms of Rule 144.2(e)"*. The CAS Panel went on to find that, on the evidence presented before the Panel, the IAAF had not met its burden of proving that Mr Pistorius's prostheses gave him an overall net advantage compared to athletes not using such prostheses.

179. The IAAF stressed that in CAS 2008/A/1480 the CAS Panel did not purport to establish any principle that it is unlawful to require an athlete to prove the absence of any performance advantage from their use of a mechanical aid. Instead, the Panel was at pains to emphasise that its decision would have *"absolutely no application to any other athlete, or other type of prosthetic limb" and that each case "must be considered by the IAAF on its own merits"*. While the Panel noted that the IAAF *"rightly accepted the burden of proof"*, this comment simply reflected the fact that the rule in force at the time (which was different to Rule 144(3)(d) of the IAAF Competition Rules/WA Technical Rule 6.3.4) placed the burden on the IAAF. Nothing in the Panel's decision in CAS 2008/A/1480 suggests that it would be unlawful to place the onus on the athlete to prove that they do not receive an overall net advantage from their prosthetic aids.

180. The IAAF went on to describe how, following the decision in CAS 2008/A/1480, the following important developments occurred:

- In late 2009, Dr Weyand and Dr Matthew Bundle published a paper (the "Weyand-Bundle Paper")[9] which showed that data from the study of Mr Pistorius's running mechanics (which had not been presented to the CAS) demonstrated that Mr Pistorius had clear advantages over athletes who did not use prosthetic limbs. The Weyand-Bundle Paper explained that Mr Pistorius had *"stride and step frequencies nearly 10% greater than those measures for two of the fastest individuals in recorded human history"* and that this was *"artificial and clearly attributable to a non-biological factor"*, namely the fact that Mr Pistorius's artificial limbs weighed less than half the weight of fully biological lower limbs. In addition, Mr Pistorius's relatively longer ground contact lengths were also *"advantageous for speed"* and were caused by *"the relatively greater compliance of his artificial limbs"*. The Weyand-Bundle Paper *"conclude*[d] *that the moment in athletic history when engineered limbs outperform biological limbs has already passed"*.

- In addition, although in 2008 Mr Pistorius was the only amputee athlete who had run times fast enough to compete effectively against able-bodied runners, in the years following the decision in CAS 2008/A/1480 the landscape changed *"dramatically"*. In particular, between 2012 and the present date a total of 29 male bilateral transtibial amputee athletes have featured in the 400m rankings produced by the IPC and World Para Athletics. Those athletes' performances have been *"remarkable"*:

    - Nine of the 29 bilateral transtibial amputee athletes have run the 400m event in under 50 seconds (the benchmark for a world class non-amputee athlete).

    - Seven of them (approximately 24%) have run the 400m in under 47.4 seconds (a time that only 10% of elite able-bodied athletes achieve).

    - Six of them (approximately 20%) have run times that would place them in the top 2.16% of elite 400m runners in the world.

    - Mr Leeper's personal best of 44.38 seconds is well within the Olympic qualifying time and is only 1.35 seconds slower than the fastest time ever run by a non-amputee athlete.

- In 2015, Markus Rehm, a unilateral transtibial amputee from Germany, won the gold medal in the long jump at the IPC World Athletics Championships with a jump whose length would have won him the gold medal at the two previous Olympic Games. Following this, the German athletics federation requested the IAAF to adopt a new rule which would remove any assessment of advantage and provide instead that amputee athletes using prosthetics would be scored separately from other athletes. After taking

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9 WEYAND P. G., BUNDLE M. W., Point: *Artificial limbs do make artificially fast running speeds possible.* J Appl Physiol (1985). 2010; 108(4):1011–2

legal advice, the IAAF Council decided to leave open the possibility for amputee athletes to compete in the same classification as able-bodied athletes, but to place the burden on the former to establish that their prosthetics gave them no overall competitive advantage. To this end, the IAAF adopted Competition Rule 144(3)(d) (now WA Technical Rule 6.3.4).

- In 2016, Mr Rehm arranged for an expert study to be carried out on him and other amputee long jumpers. The study found that the experts were unable to state whether Mr Rehm's prosthetic limb did or did not provide him with an overall advantage. In light of this, Mr Rehm accepted that he was unable to meet his burden under IAAF Competition Rule 144(3)(d). He did not challenge the rule but rather accepted its validity.

- Also in 2016, a paper was published by M. J. Connick *et al.* which showed that the formula used to develop the original MASH rule systematically over-estimated the maximum height of double amputee sprinters by 7cm and therefore enabled double-amputee sprinters to continue to *"run tall"* (the "Connick Paper")[10]. Accordingly, with effect from 1 January 2018 the IPC changed the MASH rule by replacing the old formula with a much more accurate formula identified in the 2016 study.

- When Mr Leeper's doping ban ended in June 2017, he did not resume IPC/WPA competition. Instead, he competed in competitions which were organised by the IAAF's member federations. Those competitions were not governed by the IPC's MASH rule. According to the IAAF, Mr Leeper did this specifically in order to avoid having to decrease his running height.

181. The IAAF submits that the Rule is *"exactly analogous"* to the rule governing TUEs. Mr Leeper's experts have erroneously interpreted the rule to mean that as long as Mr Leeper's RSPs do not enable him to run faster than every other athlete, they do not give him a relevant advantage. This is wrong: the issue is whether Mr Leeper's RSPs make him a better athlete than he would be if he had biological legs, not whether they make him better than every other athlete in the world. The approach adopted by Mr Leeper's experts would be akin to saying that an athlete is permitted to take a prohibited substance provided that it only makes him as good as the best athletes in the world. The IAAF submits that if Mr Leeper's RSPs enable him to move from the second tier to elite level, then they are still unfair even if he does not beat all other elite athletes.

182. The IAAF submits that the Rule does not infringe the CRPD. In particular:

- Even if (which it does not accept) the CRPD was applicable as part of the law of Monaco, the duty under Article 4.1 to ensure and promote the full realisation of all human rights and freedoms for all disabled persons without any kind of discrimination only applies to State Parties. The IAAF is not a State Party, nor a public authority exercising state powers.

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10 CONNICK M. J. *et al.*, *Evaluation of methods for calculating maximum allowable standing height in amputees competing in Paralympic athletics*, Scand J Med Sci Sports, 2016 Nov 26(11): 1353-1359.

It is a private body exercising private, contractual powers. As such, the CRPD does not apply to it.

- In any event, Article 2 of the CRPD defines discrimination as including *"denial of reasonable accommodation"*, which means a denial of *"necessary and appropriate modification and adjustments not imposing a disproportionate or undue burden"*. The national legislation that follows this approach (*e.g.* the UK Equality Act 2010) places the burden on the person with a disability to prove that the accommodation they have requested would be a reasonable one for the defendant to have to make. Only once they have established this does the defendant have a duty to make that accommodation. In circumstances where disability legislation requires the disabled person to prove that the accommodation he is seeking to be made to normal arrangements is reasonable, it cannot be unlawful for the IAAF to require Mr Leeper to prove that allowing him to use his RSPs in 400m races gives him no overall competitive advantage over other competitors who do not use such aids.

183. The IAAF likewise submits that the Rule does not violate Article 14 ECHR. In particular:

- The obligations under the ECHR only apply to State Parties. The IAAF is not a State Party (nor a public authority of a State Party) and therefore it is not bound by any obligations under the ECHR.

- In any event, Article 14 ECHR does not establish a freestanding right against discrimination. Instead, it only prohibits discrimination in *"the enjoyment of the rights and freedoms set forth in* [the ECHR]*"*. Mr Leeper's Statement of Appeal asserts that the Rule infringes his right to a fair trial under Article 6(1) ECHR. However, the rule is not a disciplinary rule which leads to the imposition of sanctions, but rather an eligibility rule. Accordingly, the rule does not fall within the ambit of Article 6(1) ECHR.

- Even if Article 6(1) were engaged by the rule, Mr Leeper has not established that the rule affects his ability to make his case or present his evidence, or places an impossible burden on him. The rule does not impose any restrictions on the arguments he can make or the evidence he can submit; nor does it deny him due process in pursuing his application.

184. In CAS 2018/O/5794 & CAS 2018/A/5798 the CAS Panel held that the right to equal treatment is not absolute. Instead, *"a rule that imposes differential treatment on the basis of a particular protected characteristic is valid and lawful if it is a necessary, reasonable and proportionate means of attaining a legitimate objective"*. Applying that approach, the IAAF submits that there are good reasons for requiring Mr Leeper to prove that his RSPs do not give him an overall competitive advantage.

185. First, there is compelling evidence concerning the over-representation of bilateral transtibial amputees in the rankings of elite 400m runners. In this regard:

- In 2008, Oscar Pistorius was the only double amputee athlete who was running elite times in the 400m event. It appeared to be a real possibility that he was *"simply a truly exceptional athlete"* whose use of RSPs enabled him to achieve his athletic potential, rather than exceed

it. However, that is no longer the case. As explained above, no fewer than 29 bilateral transtibial amputee runners have run the 400m in under 51 seconds. Six of those 29 have run times that would place them in the top 2.16% of elite 400m runners in the world.

- The IAAF's experts opine that there are two possible explanations for the striking over-representation of transtibial bilateral amputees in the ranks of world class 400m. One possibility is that a disproportionately high number of world-class 400m runners are affected by bilateral transtibial amputations. Another possibility is that the overrepresentation is compelling *prima facie* evidence that RSPs give bilateral transtibial amputees an artificial performance advantage.

- In CAS 2018/O/5794 & CAS 2018/A/5798, the CAS Panel held that the over-representation of 46 XY DSD athletes among elite female 800m runners was compelling evidence that such athletes derive a performance advantage from their DSDs. In the present case, there is a striking contrast between the *"tiny"* proportion of the general population who are bilateral transtibial amputees and the fact that more than 20% of bilateral transtibial athletes achieve times which are achieved by less than 2.2%of elite non-amputee 400m runners. This is strong evidence that RSPs provide a significant performance advantage over those not using RSPs.

186. Second, important scientific knowledge has emerged since CAS 2008/A/1480 was decided in 2008:

- Following CAS 2008/A/1480, in 2009 Dr Weyand and Dr Bundle presented data which show that Mr Pistorius's sprinting mechanics are *"anomalous and directly attributable to how much lighter and springier his artificial limbs are"* and that the RSPs *"enhance spring running speeds by 15-30 percent"*. As a result of the lighter weight of his RSPs, Mr Pistorius swung his legs faster than anyone else had ever recorded (including 17.4% faster than world champion non-amputee sprinters) and was *"quite literally off the biological charts"*.

- Dr Herr and Dr Grabowski acknowledge the hypothesis that increasing length of RSPs to create longer legs could improve running speed – a view which is reflected in the MASH rule.

187. Third, the differences between Mr Leeper's race performance and those of his able-bodied competitors are clearly observable. The integrity of athletic competition is threatened if stakeholders in the sport can clearly see that an athlete who is using restricted equipment has a very different race performance to other athletes.

188. Further, Mr Leeper has made comments which reinforce the concern about the integrity of competition. For example, in an interview in 2013 Mr Leeper expressed the hope that laboratory-designed improvements to his RSPs could *"shav*[e] *tenths of a second off"* and lead to world records being broken by athletes with RSPs.

189. In this regard, the IAAF noted the athletics community has frequently questioned the fairness of allowing double amputees to compete with RSPs in the same classification as non-amputee athletes. It was those widespread expressions of concern, together with the emerging observational data and the disclosure that important evidence had been withheld from the CAS Panel in CAS 2008/A/1480, that led the IAAF to amend the rules in 2015 to place the burden on the athlete wishing to use a mechanical aid to demonstrate that it provided no overall competitive advantage.

190. In its Answer, the IAAF subjected the Grabowski Report to a detailed critique which argued that the report was *"fundamentally flawed"* and does not come close to establishing that it is more likely than not that Mr Leeper derives no overall competitive advantage from his RSPs. On the contrary, the IAAF submits that the scientific evidence shows that Mr Leeper obtains a performance advantage of 7 – 8 seconds by virtue of those RSPs.

191. First, the IAAF submits that the Grabowski Report inexplicably fails to address at all the significant over-representation of bilateral transtibial amputees in the elite 400m performance rankings. The authors of the Grabowski Report made no attempt to include any of the other bilateral transtibial amputees who have run under 50 seconds in the study. Nor did they examine the significant dataset relating to the results of those bilateral transtibial amputees since 2008. This constitutes a fundamental failure in the study and report.

192. Second, the Grabowski Report ignores the potential advantages of Mr Leeper's RSPs. Respected scientists have identified several possible ways that RSPs may provide an artificial performance advantage. The authors of the Grabowski Report have previously acknowledged in a published paper[11] ("the Beck Paper") that, *"Hypothetically, longer legs could improve running speed by increasing the forward distance traveled during ground contact while accounting for step frequency and the stance average vertical ground reaction force"*. Yet despite that recognition in the Beck Paper, the Grabowski Report does not address or even acknowledge this point. Moreover, while Dr Grabowski has provided the leg length in every other study of amputee runners she has authored, the Grabowski Report notably does not provide Mr Leeper's leg length.

193. Third, the IAAF submits that there are multiple indications of a lack of objectivity and impartiality on the part of the authors of the Grabowski Report. For example:

- In the Statement of Appeal, Mr Leeper's lawyers state that Dr Grabowski and her colleagues were *"enlisted to make his case"*. This suggests that the authors of the Grabowski Report were engaged to generate evidence that could support the Application, rather to undertake an objective scientific assessment.

- In addition to Mr Leeper's case, Dr Grabowski has been involved in three other cases concerning whether an amputee athlete derives an artificial competitive advantage from their prosthetics. In each of those cases, she appeared on the side of the amputee athlete. She therefore appears to have become personally committed to the cause of including

11 BECK O. N., TABOGA P. AND GRABOWSKI A. M., *Reduced prosthetic stiffness lowers the metabolic cost of running for athletes with bilateral transtibial amputations*, J Appl Physiol 122: 976–984, 2017

disabled athletes in Olympic sport, which casts doubt on her objectivity (in support of this submission, the IAAF cited various statements that Dr Grabowski had made regarding her role in those cases).

- Dr Grabowski and her colleagues recently published the Taboga 2020 Paper concerning the effect of prosthetic height on speed (which is cited by Dr Herr) without declaring their involvement in these proceedings.

- The bias is also clear from the *"one-sided"* character of the Grabowski Report. While the authors go into great detail in establishing and quantifying the perceived disadvantages of the RSPs, they dismiss any need to assess whether the RSPs provide an advantage. This demonstrates that the authors have not been entirely objective and impartial on the conduct of their research and their analysis of the issues.

194. Fourth, the IAAF submits that the specific findings in the Grabowski Report concerning the effect of Mr Leeper's RSPs are wrong. In summary:

- While Mr Leeper's RSPs do cause him to accelerate slower than athletes who do not use RSPs, the Grabowski Report's quantification of the disadvantage at 1.41 seconds is obviously overstated and unreliable. In fact, the disadvantage is minimal because acceleration only plays a small part in 400m success compared to sustained steady-speed running. Moreover, since Mr Leeper does not expend full force at the start of the race, he is able to sustain high speed for longer than his competitors. As a result, he runs the second half of the 400m race significantly faster than those competitors.

- While the parties' experts agree that Mr Leeper attained a world class maximum velocity, the Grabowski Report does not address how he achieves this. In particular, it fails to examine whether this is caused by his RSPs, rather than his natural ability. The IAAF's experts have examined this issue and have concluded that Mr Leeper's world class speed is caused by his artificially lengthened RSPs, which enable him to run on legs nearly six inches longer than they would be if his legs were intact.

- The IAAF's experts completely reject the Grabowski Report's conclusion that Mr Leeper's RSPs cost him 0.4 seconds during the third 100m of the 400m race. The model on which the Grabowski Report's conclusion is based is *"clearly not accurate"*. The conclusion is also contradicted by Mr Leeper's real-life performance, where he gains ground on his able-bodied competitors during this phase of the race.

- It is common ground that Mr Leeper has a normal sprint endurance profile. However, Mr Leeper runs faster than non-amputee athletes during the second half of the 400m race. For example, when he set his personal record he ran the last 100m in a time of 11.32 seconds, which is 9.9% faster and more than three standard deviations outside the average time (12.57 seconds) of the non-amputee sprinters in the 400m final at the 2017 IAAF World Championship. The IAAF's experts show that Mr Leeper spends significantly more of the race in his *"Top Speed Zone"* than other elite 400m runners. The IAAF's experts

consider that Mr Leeper's unusually strong performance in the later stages of the race reflects his lower-energy start and greater maximum velocity, both of which are caused by the disproportionate height of his RSPs.

195. The IAAF submits that Mr Leeper's limb measurements demonstrate that he runs on RSPs that are disproportionately long. His bodily dimensions above the knee are those of a 1.74m (5'9") tall male. On that basis, his legs should be 92cm long. However, his RSPs are fixed at a length which makes his legs 107cm long. As a result, Mr Leeper runs on legs equal in length to the legs of 2.02m (6'8") tall male. The IAAF's experts explain that if Mr Leeper were to reduce the length of his RSPs so that he ran at his MASH (a 14% reduction from the height he actually runs at) then this would reduce his top sprint speed by 14%.

196. Accordingly, even if the Grabowski Report was correct that Mr Leeper's RSPs confer disadvantages in terms of initial acceleration and curve running that cost Mr Leeper 1.81 seconds during a 400m race, his RSPs would still give him a net competitive advantage of more than six seconds. However, the 1.81 seconds quantification in the Grabowski Report is significantly overstated (at best). Accordingly, the IAAF submits that Mr Leeper's RSPs give him an overall net advantage of seven seconds or more. An advantage of this magnitude is "*massive*" in elite 400m sprinting.

197. In support of its request for relief, the IAAF adduced the following evidence:

Edwin Moses

198. The IAAF adduced evidence from Edwin Moses. Mr Moses is a retired elite-level athlete and former world record holder and Olympic gold medallist in the men's 400m hurdles. He competed in three Olympic Games, winning the gold medal at the 1976 and 1984 Olympic Games in Montreal and Los Angeles, respectively, and winning the bronze medal at the 1988 Olympic Games in Seoul. In 1976, he set a new world record in the 400m hurdles; a record which he subsequently lowered on three further occasions. After retiring from competitive athletics Mr Moses served on the International Olympic Committee's Athlete's Commission, Medical Commission and Ethics Commission and on the Athletes Advisory and Executive Committees of the United States Olympic & Paralympic Committee. He also chaired the Education Committee of the World Anti-Doping Agency and the Laureus World Sport Academy. He is the current chair emeritus of the United States Anti-Doping Agency.

199. Mr Moses began his witness statement began by stressing both his deep respect for the accomplishments of Paralympic athletes and his belief in the importance of protecting the integrity of athletic competition by ensuring that factors outside natural talent and training do not play an important role in determining the outcome of competition.

200. Mr Moses explained that at the request of the IAAF he had watched footage of Mr Leeper's performances in the 400m event and had read the Grabowski Report. Mr Moses stated that he was concerned that the authors of the Grabowski Report had failed to appreciate *"the enormous*

demands" that training for and competing in the 400m event places on the human body, how athletes manage those demands, and how using RSPs might affect this.

201. Mr Moses explained that the 400m event is an *"intense and enormously demanding athletic discipline"*. In order to excel at it, an athlete requires outstanding natural anatomical, physiological and psychological talents, and a training programme adapted to those talents. Mr Moses described the strains that are placed on an athlete's body during a 400m race, and the sources of energy which sustain that performance throughout the race. In this regard, he described the effects of anaerobic exercise and the fatigue that occurs in the calf, ankle and foot muscles as a result of the accumulation of lactic acid during a 400m race. As a result of that fatigue, during the final quarter of a race *"you feel like you are breaking down"* and an athlete must struggle to overcome the body's natural instinct to slow down.

202. Mr Moses went on to opine that the use of RSPs *"appear to confer significant advantages"*. In particular:

- Mr Moses *"would expect"* the use of RSPs to reduce the impact and demands on the user's cardiovascular and pulmonary systems and the metabolic cost of running, since (a) RSPs are lighter than an intact lower leg; and (b) the body does not need to divert oxygen via the blood to the lower leg extremities; instead the oxygen can be concentrated in an athlete's back, core and upper legs.

- RSPs can be increased in length, enabling the user to increase the length of their legs. It is *"difficult to exaggerate the advantage this confers"* by giving an athlete greater leverage and a longer stride length. If an athlete can run taller than their natural height by using longer RSPs, then this gives them an important advantage which is both *"unnatural"* and *"unfair"*.

- Unlike biological legs, RSPs do not fatigue during a race. Moreover, an athlete who uses RSPs does not experience build-up of lactic acid beyond their upper legs. As a result, athletes who use RSPs avoid the effects of this *"major constraining factor"*.

- Athletes who use RSPs do not need to worry about preventing injuries to the architecture of the calf, ankle and foot. For non-amputee athletes, fatigue- and accident-related injuries can be common and can prevent athletes from training and competing for long periods of time. The *"work and battle"* to avoid such injuries is *"constant"* for non-amputee athletes. The contrast in this regard between non-amputee athletes and amputee athletes who use RSPs is *"difficult to exaggerate"*.

203. In respect of the Grabowski Report, Mr Moses stated:

- Given the *"numerous differences"* between running on a treadmill and racing on a track, the use of treadmills to gather data on Mr Leeper's running performance is *"an imperfect simulation of an actual race and the racing surface"*.

- The authors did not assess Mr Leeper's anaerobic capacity beyond referring to his split-times during the speed endurance phase of the 400m race. Since anaerobic capacity plays a significant part in an individual's ability to compete at elite level, this is an important omission in the Grabowski Report.

204. Regarding Mr Leeper's performance during races, Mr Moses made the following observations:

- Mr Leeper is unable to push off the starting blocks as effectively as runners with biological legs. This appears to be *"a clear biomechanical disadvantage from running on blades"*. However, if Mr Leeper's effort is mostly or entirely biomechanical, rather than metabolic, then the start of the race may not be as taxing/fatiguing for him as it is for non-amputee athletes. It is possible therefore that the disadvantage is *"neutralized"* by virtue of that saving of energy.

- Mr Leeper picks up speed between 150m and 250m, which is the point in the race when most athletes' metabolisms switch from primarily aerobic to primarily anaerobic functioning. Since Mr Leeper has both a sub-par start and sub-par aerobic capacity, his performances in the 400m event suggest that either (a) he begins anaerobic energy production earlier and maintains it for longer (which is unlikely); or (b) the RSPs enable him to *"change the nature of the metabolic cost and phases of the race to something different from what non-amputee athletes experience"*.

- Mr Leeper gains ground quickly around the second curve in the 400m event. The Grabowski Report suggests he should be decelerating faster than other runners on the curve because of the limitations of his RSPs, but in fact the opposite is the case.

- Mr Leeper is much faster than other athletes during the final 100m. Mr Leeper appears to lean forward at this point. This is the ideal running stance from a biomechanical perspective; however lactic acid accumulation makes it difficult for able-bodied athletes to maintain such a stance at this stage of the race.

205. Mr Moses went on to address Mr Leeper's split times for the 400m race in Prague in 2018. Mr Moses stated that the difference between Mr Leeper's performance and other athletes' performance in the final 200m was *"extraordinary"*, as was the fact that Mr Leeper ran a negative split (*i.e.* running the second 200m faster than the first 200m). A negative split is *"almost unheard of"* in an elite 400m race. In particular, the physiological demands of the event – in particular the effects of lactic acid in the final 150m or so – make it impossible to run both a fast time and a negative split. A clean elite 400m runner would never choose a pacing strategy which aims for a negative split. Indeed, elite 400m sprinters generally run the second half of the race about 1.2 seconds slower than the first half.

206. Mr Moses concluded his statement by identifying three questions which, to his mind, the Grabowski Report leaves unanswered:

- First, how does an athlete who accelerates so slowly out of the starting blocks, and who has sub-elite aerobic capacity, run the 400m in a time of 44.38 seconds (which is well inside the Olympic qualifying time)? What is powering his performances?

- Second, how does an athlete who is acknowledged to be sub-elite in these critical respects achieve a time of 22.16 seconds in the second 200m of the 400m race? Why does he not fatigue like all other athletes?

- Third, what factor other than the RSPs explains why Mr Leeper is almost 10% faster than the world's very best 400m runners in the final 100m of the race?

207. Mr Moses gave evidence by video-link at the hearing. Mr Moses was asked whether athletes who wish to use particular running shoes are required to demonstrate that the shoes will not provide them with a competitive advantage before they are permitted to use the shoes. Mr Moses stated that he was not aware of any such requirement, but that the requirement for shoes to have been publicly available for a certain period before it can be used in competition excluded the possibility of any athlete gaining an unfair advantage from such usage. Mr Moses was also questioned about comments he made when conferring an award on Oscar Pistorius to celebrate his achievements at the 2012 Olympics. Mr Moses explained that he had no role in deciding whether Mr Pistorius should receive such an award; he was merely acting on behalf of the Laureus World Sports Academy which had voted to confer the Award. Mr Moses was also questioned about the effectiveness of a race strategy to run the start of the 400m slower in order to enable a faster finish. Mr Moses replied that it would be *"almost suicidal"* for a 400m runner deliberately to run the start of the race slower in the hope of increasing their pace in the later stages of the race. In his view, such a strategy would simply not work in practice.

Dr Peter Weyand and Dr Matthew Bundle

208. Peter Weyand is a Professor of Applied Physiology and Biomechanics at Southern Methodist University in Dallas, Texas. He has held a range of academic posts, and has directed research laboratories at Rice University and Southern Methodist University in the United States.

209. Matthew Bundle is an Associate Professor at the School of Integrative Physiology and Athletic Training, which is part of the College of Health at the University of Montana. He specialises in the study of locomotion in humans and animals, and has conducted extensive research on the limits of human performance.

210. Drs Weyand and Bundle produced a joint expert report which set out their evaluation of the Grabowski Report and provided their expert opinion on whether Mr Leeper derives an overall competitive advantage from using RSPs.

211. Drs Weyand and Bundle began their joint report by summarising their involvement as part of a six-person team of experts (which also included Dr Grabowski and Dr Herr) in the CAS 2008/A/1480 case in 2008. They explained that at that time there was *"essentially no scientific evidence to draw upon"* in order to assess whether Mr Pistorius had a competitive advantage over

non-amputee sprinters. The evidence which the team of experts gathered established that Mr Pistorius's speed-duration profile and physiological responses to running were the same as non-amputee athletes. However, analysis of Mr Pistorius's running mechanics showed that his prosthetic blades resulted in *"substantial advantageous deviations from non-amputee mechanics"*. Most strikingly, the prosthetic blades enabled Mr Pistorius to reposition his limbs 17% quicker than the average repositioning time of six 100m record holders, despite the fact that his fastest sprinting speed was 10% slower. Mr Pistorius's limb repositioning times were quicker by a *"substantial margin"* than the quickest times ever measured for any other competitive sprinter. In addition, their analysis established that by *"functionally elongating the length of his legs"*, Mr Pistorius was able to extend the amount of time that his blades exerted force on the ground beyond what was typical for non-amputee track athletes. The ability to do this enhanced Mr Pistorius's top speed compared with non-amputee sprinters.

212. The data concerning Mr Pistorius were published in 2009 in the Journal of Applied Physiology (the "2009 Pistorius Paper")[12]. The authors of the 2009 Pistorius Paper included Drs Weyand and Bundle and Dr Grabowski and Dr Herr. The authors could not agree what the data actually showed. Drs Weyand and Bundle believed that the data indicated *"beyond any reasonable doubt"* that Mr Pistorius was advantaged by his prosthetic blades. Dr Grabowski and Dr Herr, on the other hand, argued that the data were inconclusive, or that Mr Pistorius might be disadvantaged. It was this disagreement that led to the publication of the data.

213. Drs Weyand and Bundle reached the following conclusions in their joint expert report concerning Mr Leeper:

- Mr Leeper runs on prosthetic lower limbs that are *"disproportionately long"*. In particular, while Mr Leeper's bodily dimensions above the knee are those of a 1.74m (5'9") tall male, he races on legs which are *"equal in length to those of a 2.02 meter or 6'8" tall male"*.

- It is well established that longer legs are advantageous to sprint running performance. The advantage enjoyed by a bilateral amputee running on lengthened limbs can be quantified.

- The claim in the Grabowski Report that longer legs do not provide a competitive advantage for 400m running *"is contrary to current understanding, and ignores the findings of the most relevant biomechanics and spring running performance literature on this issue"*.

- Using the protocols adopted in the Grabowski Report (which were initially developed by Drs Weyand and Bundle) if Mr Leeper shortened his RSPs so that his leg length was 92cm (which would be proportionate to the rest of his body), rather than the actual 107cm length he currently races at (*i.e.* a 14% reduction in height), then the distance that his body moves forward on each contact with the ground would reduce by 15cm. As a result, his maximum velocity would reduce from 11.4 m/s to 9.8 m/s (a 14% reduction), and his time to run the 400m would increase by eight seconds.

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12 WEYAND P. G., BUNDLE M. W., MCGOWAN C. P., GRABOWSKI A., BROWN M. B., KRAM R., HERR H., The fastest runner on artificial legs: different limbs, similar function? Journal of Applied Physiology. 2009 Sep;107(3):903-11

- Although the authors of the Grabowski Report used measures which were "*relevant and appropriate*", and although there is no reason to doubt the legitimacy of the measures and data presented in that report, the methods used to analyse and interpret those data are *"frequently unsound and consistently one-sided"*. The conclusions of the Grabowski Report *"rest on flawed assumptions, selective modelling, and conditions and generalizations that do not apply to 400-meter running"* and are *"obviously invalid"*.

214. Drs Weyand and Bundle went on to provide a detailed analysis of the relationship between limb length and maximum sprinting speed. In this regard, the *"most critical determinant"* of an individual's maximum running speed is *"the minimum time of foot-ground contact"*. Since speed is equal to distance travelled per unit of time, a runner's speed can be expressed as the distance that a runner's body travels while their foot is in contact with the ground ("ground contact length") divided by the duration of that contact ("ground contact time"). In simple terms, the shorter the ground contact time, the faster the running speed.

215. Athletes tend to run with ground contact lengths that are a close function of the length of their legs. The ground contact lengths for most runners are equal to or slightly longer than their leg length. Lengthening a leg beyond anatomical proportions therefore results in a *"direct increase"* in the ground contact length.

216. In this regard, Drs Weyand and Bundle explained that by using a simple formula, they were able to calculate that if the length of Mr Leeper's RSPs was adjusted to satisfy the MASH rules, his top speed would reduce from 11.4 m/s to 9.8 m/s. Thus, a 14% reduction in Mr Leeper's leg length would result in a 14% reduction in Mr Leeper's top sprinting speed.

217. Drs Weyand and Bundle went on to explain that performance in the 400m event is *"determined by the maximum mechanical function the musculoskeletal system can provide"* over the distance of the race. As a result, the racing velocities of runners in the 400m event (and other sprint events) are *"predominantly determined by the maximum sprint velocities they can achieve"*. A runner's top speed and maximum aerobic running speed can therefore be used to make *"highly accurate"* predictions about their likely racing speeds over particular distances. Those predictions reflect the *"progressive within-race musculoskeletal fatigue that reduces the forces and lengthens the contact periods of limb-ground force application, thereby slowing racing speeds"*.

218. The Grabowski Report established that Mr Leeper conformed to that predictive relationship with the same consistency as non-amputee runners. This was also the case with Oscar Pistorius. According to Drs Weyand and Bundle, this gives rise to two important conclusions about bilateral transtibial 400m sprinters:

- First, they experience the same fatigue during sprinting, in relation to their mechanical and aerobic metabolic maximums, as non-amputee sprinters. Accordingly, *"their carbon fibre blades do not confer fatigue resistance"*. Instead, their upper leg and other musculature *"exhibit the same intrinsic time course of fatigue that non-amputee runners do"*.

- Second, since Mr Leeper's results conform to non-amputee norms, this enables the effect of his lengthened limbs on his 400m race times to be accurately quantified. In particular, that quantification establishes that if Mr Leeper's legs were reduced from 107cm to 100 cm then his 400m time would increase by 3.9 seconds, while if his legs were reduced to 92cm (to comply with his MASH height) his 400m time would increase by a total of eight seconds.

219. Drs Weyand and Bundle next provided a detailed critique of the Grabowski Report. They began by stating that the Grabowski Report was based on data that appear to be of *"reasonable quality"* and that the values reported in the report *"fell within reasonable ranges"* and, insofar as data were related to one another, those data *"support*[ed] *the soundness of the data sets provided"*. Accordingly, Drs Weyand and Bundle are *"confident"* that the Grabowski Report has competently measured and reported Mr Leeper's top speed and top speed running mechanics; that Mr Leeper's aerobic requirements and maximum aerobic speed have been assessed as well as the data from Mr Leeper allowed; and that Mr Leeper's speed-duration relationship conforms to that established for amputee athletes.

220. In contrast, however, Drs Weyand and Bundle considered the approach to evaluating Mr Leeper's advantage in the Grabowski Report to be *"fundamentally flawed"*. In particular, the Grabowski Report uses the full range of values ever recorded for non-amputee runners as the standard for assessing whether Mr Leeper was advantaged. On that approach, if Mr Leeper's maximum running speed does not exceed Usain Bolt's fastest ever speed, this would lead to the conclusion that Mr Leeper's RSPs provide him with no competitive advantage.

221. Drs Weyand and Bundle went on to state that in addition to that fundamentally flawed approach, the Grabowski Report contains *"improper assumptions made in data analysis, a failure to report critical data, and a failure to incorporate established literature and directly relevant scientific knowledge"*. Drs Weyand and Bundle highlight, in particular, the absence of any reference in the Grabowski Report to the length of Mr Leeper's racing legs. This omission is *"a conspicuous departure from the conventions in the field of biomechanics for running studies"* and could have deprived the Panel of what is *"arguably the single most important data point"* in the case.

222. In respect of the Grabowski Report's analysis of Mr Leeper's initial acceleration during the first phase of the 400m race, Drs Weyand and Bundle stated that:

- While there is *"no question"* that amputee runners are disadvantaged during sprint accelerations, the Grabowski Report *"substantially overestimated"* the extent of Mr Leeper's disadvantage and failed to acknowledge the concomitant benefits of a slower, lower exertion start.

- One of the key problems with this aspect of the Grabowski Report is that the data on non-amputee block forces are *"obviously incorrect and misrepresentative"*. In particular, the forces reported for non-amputee sprinters are *"erroneously high"*, which means that the calculation of Mr Leeper's disadvantage is also erroneously high. The Grabowski Report also ignores the fact that the disproportionate length of Mr Leeper's legs requires him to

assume a more upright position at the start, which reduces the amount of force he is able to exert on the starting blocks. It is this factor, rather than any force or power impairment caused by his RSPs, that causes Mr Leeper's slow start. To use a vehicular analogy, Mr Leeper is *"essentially forced to start and remain in a low gear with a submaximal effort while accelerating due to the balance requirement created by his long limbs"*. This can be seen in footage of Mr Leeper's races.

- Furthermore, the Grabowski Report has not applied basic balance requirements to the assessment of Mr Leeper's acceleration. As a result, the report ignores Mr Leeper's *"late race advantage"*, while his deficit in acceleration is *"substantially over-estimated"*.

223. In respect of the Grabowski Report's analysis of Mr Leeper's running biomechanics and maximum velocity, Drs Weyand and Bundle stated that:

- In finding that Mr Leeper has similar biomechanics and a similar maximum sprinting speed as elite non-amputee sprinters, the Grabowski Report has *"misreported critical comparison data"*. In particular, it is premised on the wrong ground contact value for the non-amputee comparator. Correcting for this error more than doubles the difference between that value and Mr Leeper's contact time.

- In addition, the Grabowski Report does not even consider whether Mr Leeper's elite-level maximum velocity is in fact caused by him running on disproportionately long legs.

224. Drs Weyand and Bundle stated that Dr Herr's statement that there is no evidence of a relationship between leg length and sprinting performance is *"incorrect and directly contradicted in the scientific literature"*. Drs Weyand and Bundle have compiled height data for the best 45 individual performers over a 14-year period in Olympic running events over distances between 100m and 3,000m. This shows that the best individual performers in all the sprint events *"exceed the sex-specific height norms of the larger population"*, meaning that *"being taller and having longer legs is clearly advantageous for sprint running"*. Moreover, the magnitude of the advantage derived from increased height and leg length *"becomes larger as the duration of the sprint race increases"*.

225. In addition, Drs Weyand and Bundle observe that the Taboga 2020 Paper shows that bilateral amputees ran faster with lengthened prosthetic blades, and ran slower with shortened prosthetic blades. The conclusions in the Grabowski Report are inconsistent with the data presented in that paper.

226. In respect of the Grabowski Report's analysis of Mr Leeper's curve running, Drs Weyand and Bundle stated that:

- It is unclear how the authors of the Grabowski Report calculated that Mr Leeper suffers a disadvantage of 0.4 seconds during the curve running part of the 400m race.

- A comparison of the curve running velocities of the eight non-amputee finalists at the 2017 IAAF World Championship with Mr Leeper's curve running velocity during the

400m race where he set his personal best of 44.42 seconds shows that Mr Leeper's curve running was faster than seven of those eight non-amputee athletes.

227. In respect of the Grabowski Report's analysis of Mr Leeper's running economy and aerobic capacity, Drs Weyand and Bundle stated that the report's analysis of running aerobic velocity at the aerobic maximum *"is reasonable"*. Similarly, Drs Weyand and Bundle agree with the Grabowski Report's conclusion that Mr Leeper has the same performance-duration-fatigue relationship as non-amputee athletes.

228. Drs Weyand and Bundle concluded their joint report by explaining that in the decade since the case CAS 2008/A/1480 was determined by the CAS, bilateral transtibial amputees have become much less rare in elite sprinting. An analysis of the all-time Paralympic 400m list for male transtibial unilateral and bilateral amputees shows that:

- The fastest seven athletes in the 400m event are all bilateral amputees.

- Six bilateral amputees have run times within 0.2 seconds of Mr Pistorius's personal best at the time of his CAS hearing.

- The difference between the fastest ever time for a bilateral amputee (set by Mr Leeper) and the fastest ever time for a unilateral amputee is larger than the performance difference between male and female non-amputee world record holders in the 400m event.

- The *"vastness"* of these performance differences constitutes *"compelling evidence"* of how advantaged the bilateral transtibial amputees are. The data also reflects *"the overwhelming nature"* of the overall competitive advantage that bilateral amputees have in sprint running events.

- In particular, while RSPs do result in bilateral amputees having slower starts compared with both unilateral and non-amputee runners, the degree to which bilateral amputees dominate the list of fastest times by amputee runners *"would not be possible if the blades did not advantage them so much during maximum and sustained sprint running to more than offset the modest disadvantages at the start"*.

229. Drs Weyand and Bundle concluded by stating that the data reported in the Grabowski Report showed that Mr Leeper uses *"artificially longer limbs to increase contact lengths"* and, thereby, his running speed. Further, the data show that Mr Leeper manages to sprint with *"relatively typical"* leg repositioning times even though he has the leg lengths of a much taller male. This would *"almost certainly not be possible"* to achieve without the lightness of his RSPs.

Dr Sean Tweedy, Dr Mark Connick and Dr Emma Beckman

230. Associate Professor Sean Tweedy, Dr Mark Connick and Dr Emma Beckman are all members of the School of Human Movement and Nutrition Sciences at the University of Queensland ("UQ Experts"). The UQ Experts each specialise in the development of methods for assessing neuromusculoskeletal impairments and assessing the strength of the relationship between such impairments and sports performance in order to create a classification system for para sport. Dr Tweedy is a member of the IPC's Classification Committee.

231. The UQ Experts were engaged (on a *pro bono* basis) by the IAAF in 2019 to help the ARG develop a scientifically sound assessment process for the Application. They also provided a joint expert report (the "UQ Experts' Report") in support of the IAAF's case in these proceedings. That report (which was also provided on a *pro bono* basis) set out the UQ Experts' opinion on whether the study described in the Grabowski Report proves that Mr Leeper does not derive any overall competitive advantage from his use of RSPs over athletes who do not use RSPs.

232. The UQ Experts' Report stated:

- The approach taken by the Grabowski Report was *"too narrow"* since it was based entirely on the results of a single study which evaluated five variables collected from a single athlete in laboratory (rather than competition) conditions. Since no other athlete completed the same tests at the same time as Mr Leeper, there was no direct comparison and *"very little experimental control"*. It is not possible to draw balanced conclusions about whether RSPs confer a competitive advantage from such a narrow base of evidence.

- Contrary to the conclusions of the Grabowski Report, evidence concerning RSPs in general, Mr Leeper's specific RSPs, and comparative analyses of 400m racing performances, collectively provides *"reasonably strong support"* for the hypothesis that Mr Leeper's RSPs provide him with a performance advantage over athletes who do not use RSPs.

- A range of general potentially advantageous characteristics of RSPs have been identified. They include (a) the lighter mass of RSPs compared with biological legs; (b) the fact that RSPs are adjustable whereas biological legs are not; and (c) the fact that carbon fibre materials do not fatigue during a 400m race as biological legs do.

- Mr Leeper's specific RSPs are *"some of the most biomechanically advantageous available"*. The J-shaped Ottobock 1E90 Sprinter model used by Mr Leeper has been found to enable an 8% increase in maximum running speed compared to C-shaped RSPs. Moreover, since Mr Leeper's RSPs are almost 15cm taller than he would be if he had intact legs (according to the MASH rule) the enhanced length of his RSPs may enhance his performance. Indeed, emerging evidence suggests that longer prosthetics do indeed enhance maximum running speed.

233. The UQ Experts' Report makes a number of significant criticisms of the Grabowski Report. In particular:

- The Grabowski Report did not directly assess any athlete other than Mr Leeper. Instead, it took data concerning non-disabled athletes from previous studies. Although the authors of the report acknowledged this, they did not appropriately qualify their conclusions accordingly.

- It is questionable whether the five variables measured by the Grabowski Report are sufficient to address the question whether Mr Leeper enjoys an advantage by virtue of his RSPs.

- The prediction that Mr Leeper suffers a 1.41 second disadvantage as a result of his slower acceleration was based on Mr Leeper's acceleration over 20m. However, there is no evidence that acceleration over this distance (which is just 5% of the length of a 400m race) is predictive of performance over 400m; indeed, this is unlikely to be the case.

- The measurements in the Grabowski Report were all collected under laboratory conditions and then used to predict competitive 400m performance. This is invalid because the speed, acceleration and other outcomes achieved under laboratory conditions are likely to be inferior to actual performance in competition.

- The Grabowski Report assumes that there is no interaction between any of the measures collected, or between those measures and other factors that were not measured. This is not a reasonable assumption. On the contrary, the factors that facilitate top speed and prevent deceleration *"interact dynamically"* to determine athletic performance. The interaction between factors that facilitate Mr Leeper's top speed and allow him to minimise deceleration is *"completely different"* from any non-disabled athlete. In particular, Mr Leeper's ability to spend 57% of the 400m race in his top speed zone, while slowing by only 13% at the end, is a *"radical difference"* and shows that he is *"more than five standard deviations away from the typical profile"*.

- Further, there are *"important biomechanical differences"* between Mr Leeper and non-disabled athletes when sprinting. Non-disabled athletes cannot mimic Mr Leeper's biomechanics, which are the product of his use of RSPs.

234. The UQ Experts' Report also stated that there are *"a number of indicators"* that suggest that the authors of the Grabowski Report *"did not identify, assess or manage the risk of bias"* in that report. The evidence of bias includes:

- The statement in Mr Leeper's Statement of Appeal that Dr Grabowski and her team were *"enlisted to make his case"*.

- Dr Grabowski's public confirmation that the purpose of her work with Mr Leeper was to generate evidence which would *"make an impactful change"* by supporting amputee participation in the Olympics. This suggests that Dr Grabowski and her team may have taken a *"case-building approach"*, rather than a scientific approach.

- The fact that Dr Grabowski and her team followed an *"irregular"* process to obtaining Mr Leeper's informed consent to the study they conducted on him.

- The fact that Dr Grabowski and her team have not provided any evidence that they did not conduct their research with the objective of arriving at a predetermined outcome.

- The Grabowski Report is *"remarkably one-sided"* and fails to mention the advantages (or possible advantages) that Mr Leeper might have by virtue of his RSPs.

- The inclusion of *"immoderate"* statements in the Grabowski Report, which indicates a *"lack of restraint and perspective"* indicative of bias on the part of the authors.

- The fact that in February 2020 the authors of the Grabowski Report published a paper concerning the effect of prosthetic height (*i.e.* the Taboga 2020 Paper) in which they failed to declare their competing interests in the paper. The paper's central conclusion was based on *"a fundamental statistical error"*. The effect of that error was compounded by the fact that the conclusions in the paper were *"overstated"*. This prompted the UQ Experts (and others) to write to the editor of the journal requesting the retraction of the Taboga 2020 Paper.

235. The UQ Experts' Report discussed the general features of RSPs, which are designed in order to optimise sprinting performance. In particular:

- RSPs have very low mass and are much lighter than normal biological limbs. The total mass of a healthy leg below the knee (when shod with running spokes) is estimated to be more than 5.8kg. In 2008, Mr Pistorius's prosthetic limb (including the stump) weighed about 3kg.

- The product specifications for the RSPs now used by Mr Leeper indicated that the prosthetic weight just 600g. Accordingly, the UQ Experts calculate that Mr Leeper's prosthetics weigh a total of 2.5kg – about 57% less than a normal healthy leg below the knee.

- RSPs also do not fatigue in the way that biological legs do. It is conceivable that this may enhance athletic performance.

- RSPs are also adjustable. This means that athletes using RSPs have the option (which other athletes do not) of improving running performance by adjusting the design, weight, materials and length of their RSPs.

236. The UQ Experts' Report went on to explain that the RSPs used by Mr Leeper are *"among the most biomechanically advantageous available"*. In particular:

- A recent study by Dr Grabowski *et al.* demonstrated that J-shaped prosthetics (such as those used by Mr Leeper) achieve greater maximum running speeds. In particular, Mr

Leeper's J-shaped prosthetics enables am 8% higher maximum running speed than a comparable C-shape prosthetic.

- The evidence indicates that Mr Leeper's RSPs are *"disproportionately long"*. In particular, when using his RSPs Mr Leeper's standing height is 189.2cm. This is nearly 15cm taller than his maximum allowable standing height under the MASH rules currently in force.

- Using a visual analysis of the raw data provided in the Grabowski Report, the UQ Experts stated that those data tend to support the hypothesis that increased prosthetic length enables higher maximum running speeds to be attained.

- In addition, after the IPC introduced more conservative MASH rules in 2018, many amputee runners had to decrease the lengths of their prosthetics by several inches. For example, three of the eight finalists at the T44 400m event at the 2016 Paralympic Games had to reduce their running height following the change to the MASH rules. Their best performances after the change in the MASH rules were up to six seconds slower than their best performances when running at taller heights under the former MASH rules (the UQ Experts also noted, however, that there were other athletes who were not affected, and it is possible that there were other confounding factors that resulted in the reductions described above).

237. The UQ Experts' Report contained a detailed analysis of the emergence of a cohort of elite bilateral transtibial amputee sprinters since the case CAS 2008/A/1480 was decided in 2018. In summary:

- The UQ Experts have undertaken a comparative analysis of 400m race performance of (a) non-disabled athletes; (b) bilateral transtibial amputee athletes; (c) unilateral transtibial amputee athletes; (d) unilateral upper limb amputees; and (e) athletes with vision impairment. This analysis shows that:

  - In 2019, a total of 9,113 male athletes ran the 400m in 51 seconds or under.

  - Amputees make up just 0.5% of the general population. Within the amputee population, less than 9% are bilateral below-knee amputees. In addition to the fact that the number of male bilateral below-knee amputees is very small, the cost of prosthetics (which typically cost between US$20,000 and US$35,000) is *"an additional entry barrier"*. Despite this, and despite the fact that only a fraction of bilateral below-knee amputees will choose to compete in the 400m discipline in the sport of athletics, no fewer than 10 bilateral lower limb amputees have run the 400m in under 51 seconds.

  - Six of the 10 bilateral transtibial amputees who have run the 400m in under 51 seconds have recorded times that place them within the top 3% of the 9,113 male athletes who ran 400m in under 51 seconds in 2019.

- Two of those six bilateral transtibial amputees have run inside the Olympic qualifying standard and, in each case, their personal records place them within the top 0.37% of elite 400m runners in the world.

- In contrast, although 37 unilateral upper limb amputees have run the 400m in under 51 seconds, the world record for this group of athletes is slower than the top 10% of elite non-disabled athletes.

- Although 30 athletes with minimum vision impairment have run the 400m in under 51 seconds, only the world record holder in that group of 30 has run a time which is within the times achieved by the top 10% of elite non-disabled athletes.

- Although 90% of lower limb amputees are unilateral, and although there are more unilateral transtibial amputees competing than bilateral transtibial amputees, only three unilateral transtibial amputees have broken the 51 second barrier in the 400m race, and the world record for unilateral transtibial amputees is just inside the times achieved by the top 50% of non-disabled athletes.

- These data suggest that if a bilateral transtibial athlete is sufficiently young, healthy and motivated (and if they are able to afford to purchase RSPs) then they have *"a better than even chance of achieving times that will best nearly 98% of serious competitive 400m runners who do not have a disability"*.

- The data also indicate that, when compared to his other direct competitors (viz. other bilateral transtibial amputees) Mr Leeper *"is not as exceptional as other 400m world champions"*.

238. The UQ Experts stated that these data are *"completely at odds"* with the Grabowski Report's conclusion that bilateral transtibial amputees experience a 1.81 second performance disadvantage over 400m compared with non-disabled athletes. If the Grabowski Report was correct, then this would necessarily imply that if then ten best bilateral transtibial amputees in the world had biological legs then:

- Mr Leeper would be the 400m world record holder with a time of 42.57 seconds, which is nearly half a second faster than the current world record.

- Three bilateral amputees would have made the 400m final at the 2016 Olympic Games. Two of those individuals (Mr Leeper and Mr Pistorius) would have won the gold and bronze medals respectively.

- Eight of those ten bilateral transtibial amputees would be in the top 1% of the world's best non-disabled runners.

239. Those outcomes *"do not seem even remotely plausible"* compared to the alternative hypothesis, namely that RSP *"confer an artificial performance advantage"* on their users.

240. The UQ Experts went on to explain why, in their opinion, the Grabowski Report does not demonstrate that Mr Leeper's RSPs give him no competitive advantage. They began by reiterating that the authors of the Grabowski Report did not assess any non-disabled athletes. Instead, they used data from other studies about various moderate and elite level non-disabled athletes. The authors made no attempt to control for factors such as training load, height, body mass, age etc. when selecting those studies. As a result, the validity of the comparisons is questionable.

241. The UQ Experts queried the conclusions drawn in the Grabowski Report from the assessment of Mr Leeper's acceleration over 20m. The UQ Experts are unaware of any evidence that acceleration over 20m reliably predicts performance over 400m. Indeed, the fact that Mr Leeper was found to be 43% slower than able-bodied competitors over 20m, yet still able to record comparable times over 400m, indicates that acceleration over 20m is not a good predictor of overall 400m performance. Moreover, the UQ Experts had analysed results from several IAAF World Championship 400m finals, which showed acceleration over 20m *"had little or no predictive validity"* for overall 400m performance.

242. The UQ Experts argued that the research design utilised by the Grabowski Report was based on *"methodological reductionism which lacks ecological validity"*. Specifically, the analysis in the report is based on the notion that complex systems can be understood by breaking them down into their component parts and examining them separately. However, it appears that the five variables assessed in the report are insufficiently broad to assess whether Mr Leeper has an overall advantage. In particular, there are an *"enormous number of variables"* which affect the 400m running performance of bilateral amputees. It is not possible to test all of those variables. Mr Leeper was found to have a measurable disadvantage in two of the five variables test by Dr Grabowski and her colleagues. The fact that he still manages to run world class times notwithstanding those disadvantages indicates that he must recover that disadvantage somewhere; however, none of the other variables tested indicated that he had an advantage. This indicates that the five variables evaluated by the Grabowski Report do not provide a balanced picture.

243. The UQ Experts believed that the Grabowski Report overstates the similarities between the biomechanics of running with RSPs and running with biological legs. In fact:

- A number of studies (including several written by the authors of the Grabowski Report) clearly demonstrate that runners using RSPs have different biomechanics to runners with biological legs.

- There are two critical points concerning the biomechanical differences between Mr Leeper and able-bodied competitors. First, the RSPs used by Mr Leeper are *"enabling technology"*, *i.e.* they enable him to run when otherwise he would be unable to do so. His running biomechanics are therefore dictated by the RSPs, and cannot be copied by runners with biological legs. In particular, the relative importance of the key factors that determine Mr Leeper's performance in the 400m race is different from, and cannot be replicated by, non-disabled runners. Second, the biomechanical difference threatens the

integrity of competition because it *"raises the possibility that the differences are advantageous to performance"*. In particular, if the evidence establishes that one competitor has biomechanics which are different to, and un-replicable by, other competitors then any success achieved by the former *"will erode competition integrity because competitive advantage cannot be ruled out as a factor"*.

244. The UQ Experts express the opinion that, *"The integrity of the competition will be threatened if, in addition to biomechanical evidence that Blake Leeper does run differently, stakeholders in the sport of athletics can clearly see with their own eyes that his race performance is very different"*. While slight differences in style and technique *"are part of what makes sport fascinating"*, the UQ Experts consider that, *"visually striking differences in how the athlete performs"* can, when coupled with the use of restricted equipment and scientific evidence concerning those differences, *"pose a significant threat to the integrity of an athletics competition"*.

245. The UQ Experts explained that they disagreed with the Grabowski Report's findings that if Mr Leeper had biological legs than he would run the first quarter of a 400m race 1.41 seconds faster than he does using RSPs:

- First, the UQ Experts observed that while the Grabowski Report stated that it had used *"a protocol similar to"* the di Prampero Study, in fact there is a major difference between the two studies. Whereas the Grabowski Report studied Mr Leeper's speed over 20m, the di Prampero Study measured speed over 30m (*i.e.* 50% longer). Given Mr Leeper's slow acceleration, reducing the distance over which he could accelerate by 10m (one third) is important.

- Second, there are several other questions concerning the acceleration *"protocol"* used by the Grabowski Report. For example, while the Grabowski Report estimated Mr Leeper's peak acceleration to be 3.6 m/s/s (which is much slower than the 6.42 m/s/s recorded in the di Prampero Study), the report assessed his peak velocity to be 10.46 m/s (which is higher than the di Prampero Study athletes). This is *"odd"* since it is unclear how Mr Leeper could have achieve a higher peak velocity with a slower acceleration over a shorter distance than the di Prampero Study athletes. Indeed, the UQ Experts' calculations suggest that Mr Leeper could not reach his top speed until sometime after the 80m mark.

- Third, the Grabowski Report's use of a model to predict Mr Leeper's 100m time is *"questionable"* since this is something which could in fact be measured directly. The questionable nature of that approach is underscored by the fact that the time predicted by the model was more than one and a half seconds slower than Mr Leeper's actual personal best over 100m. This difference is *"very big"* and calls into question the validity of the formula used to calculate his predicted time.

246. The UQ Experts also explained why they disagreed with the Grabowski Report's finding that Mr Leeper would run the third quarter of the 400m event 0.40 seconds faster if he had biological legs. In particular:

- During the 400m race where he set his personal record of 44.42 seconds, Mr Leeper's average speed for the back straight was 9.69 m/s and his average speed for the curve was 9.23 m/s. This contrasts with the running speeds in the experimental data of 9.49 m/s and 8.94 m/s. These differences suggest that the higher speeds achieved during competition conditions would provide a more accurate indication of Mr Leeper's curve running performance.

- Mr Leeper's normalised curve running was also higher during that race than during the experimental conditions. This means that the extent to which Mr Leeper slowed on the curve was less than in the experimental conditions. Once again, this suggests that the experiment might not accurately reflect real world conditions.

- According to the curve running model produced by Greene P. R., Mr Leeper would be expected to run 2.2% slower in the third quarter of the 400m race. In the race where he set his personal best, however, Mr Leeper slowed by 4.8% and non-amputee athletes slowed by 8.6%. So while the Grabowski Report predicts that Mr Leeper would slow by more than the non-amputees during this phase of the race, in fact the opposite happened.

- For these reasons, the UQ Experts do not accept that Mr Leeper decelerates more around the curve than his able-bodied competitors. On the contrary, the observational evidence suggests that he runs comparatively faster round the curve than those competitors, and gains considerable ground on them.

247. The UQ Experts went on to state that in addition to these methodological issues, the Grabowski Report's conclusion that Mr Leeper would run 400m 1.81 seconds faster with biological legs is highly doubtful because it assumes that Mr Leeper derives no advantages at all from his RSPs that have to be set off against the alleged disadvantages. That assumption is, in turn, based on the assumption that his world class performance in three of the five factors studied is due to the fact that he is naturally a world class performer, and are no way attributable to artificial enhancement from his RSPs. The Grabowski Report never considers the possibility that Mr Leeper is a good but non-elite athlete whose RSPs enable him to achieve elite level performances. The Grabowski Report should have considered that possibility and fails to explain why it did not.

248. The UQ Experts observed that the Grabowski Report found that Mr Leeper had much slower starting acceleration and curve running velocities as abled bodied athletes, but had similar maximum velocity, relative aerobic intensity and sprint endurance as those abled bodied counterparts. The Grabowski Report entirely fails to consider or explain, however, how it is possible for Mr Leeper to have a starting acceleration *"equivalent to that of a 9 year old boy"*, and to suffer further disadvantage during curve running, yet to run overall 400m times faster than 99.88% of elite non-disabled runners. This is a significant flaw. In particular, if it is right that Mr Leeper suffers such a pronounced disadvantage during the first part of the 400m race, it logically follows that he must recover that time somewhere in order to run the elite-level times that he does. However, the Grabowski Report neither captures nor considers this critical point.

249. The UQ Experts' Report concluded by repeating the UQ Experts' conclusion that the evidence presented in the Grabowski Report does not establish that Mr Leeper enjoys no overall competitive advantage through the use of his RSPs. On the contrary, the UQ Experts consider that, *"in aggregate, the best available scientific evidence indicates the opposite is more likely to be true – that RSPs do confer an advantage"*.

250. In their supplementary report dated 10 July 2020 (the "UQ Experts' Supplementary Report") the UQ Experts explained why the Grabowski Response did not change any of the conclusions contained in the UQ Experts' Report. In respect of initial acceleration, the UQ Experts explained that:

- Dr Grabowski had misrepresented the UQ Experts' analysis. They did not say that the *"acceleration phase"* has no predictive validity for overall 400m performance. Rather, they said that *"maximum 20m acceleration"* has little or no predictive validity for 400m performance. The acceleration phase of the race is *"definitely important"* to overall performance; however, that phase is much longer than 30m. Dr Grabowski has failed to acknowledge or rebut the specific point that maximum acceleration over 20 has little of no predictive validity regarding 400m performance. She has failed to identify a single study supporting her position.

- None of the 10 studies cited by Dr Grabowski investigated the correlation between horizontal forces during acceleration and spring performance over 400m.

- The probability that Dr Grabowski is able to use Mr Leeper's maximum acceleration over 20m to predict the time disadvantage caused by Mr Leeper's RSPs over 400m is *"vanishingly small"*.

- Dr Grabowski does not dispute the UQ Experts' point that competitors do not sprint maximally for the first 20m of a 400m race – a point which is *"amply supported"* in the scientific literature. Athletes do not accelerate maximally at the beginning of a 400m race because, if they did, they would *"burn out"* longer before the 400m mark. Instead, they *"almost uniformly"* run a first 200m that is not maximal but is slightly faster than the second 200m (*i.e.* a positive split). In contrast, Mr Leeper runs an approximately even or even a negative split. Dr Grabowski has failed to point to anything to suggest that this difference is caused by anything other than Mr Leeper having RSPs rather than biological legs.

251. In respect of the impact of prosthetic height on maximum velocity, the UQ Experts explained that the MASH rule is directly relevant to the question of whether Mr Leeper has an overall competitive advantage over non-amputee athletes, since the MASH rules seek to ensure that Mr Leeper's RSPs do not enable him to run taller than if his legs were intact. The MASH rules ensure that all double amputees race on legs that are proportionate in length to the rest of their body, so that they are not advantage over non-amputee athletes (who are limited by the height of their biological legs), unilateral amputee athletes (who are limited by the height of their single biological leg) or other bilateral transtibial amputees (because, according to the UQ Experts, *"a competition between bilateral amputees running at varying heights but always proportionate to their intact body*

segments has competition integrity in the same way as a race between non-amputee athletes of different heights"). The UQ Experts strongly disagree with Dr Grabowski's criticisms of the current MASH rule, which they insist is based on the best available science and is accurate in calculating how long a double-amputee's legs would be if they were intact. The previous MASH rule had been shown to systematically overestimate standing height by 7 cm. The new MASH rule, however, has a systematic bias of just 0.2 cm.

252. The UQ Experts state that the data in the Taboga 2020 Paper do not prove that prosthetic height has no effect on maximum speed. In particular, the study only examined five athletes. Given the small number of athletes studied, it is unsurprising that the results showed no statistically significant effect of prosthetic height on speed. Moreover, the authors were mistaken in their interpretation of what the result means. In particular large non-significant p-values *"do not provide statistical evidence as to the truth of the null hypothesis"*. In other words, the absence of evidence is not evidence of absence.

253. The UQ Experts note that in the study reported in the Taboga 2020 Paper, the subjects of the study only ran on their normal RSPs at the height and stiffness they were used to in one of the 15 configurations tested. However, it takes time for an amputee to familiarise themselves with different RSP models and height/stiffness configurations. If these confounding factors are removed, and you look only at the maximum speed attained by each subject when using his standard RSPs at the usual stiffness, then it is apparent that four of the five subjects studied achieved their maximum velocity when running at either +2cm or +4cm.

Relief claimed by the IAAF

254. In its Answer, the IAAF sought the following relief:

> *"For the reasons set out above, World Athletics respectfully asks the Panel:*
>
> *7.1.1 to rule that Technical Rule 6.3.4 is valid, lawful, and enforceable as written;*
>
> *7.1.2 to find that the Appellant has not met his burden under Technical Rule 6.3.4 of proving that his Ottobock 1E90 Sprinter prosthetic blades give him no overall competitive advantage over non-blade users;*
>
> *7.1.3 as consequence, to find that:*
>
> > *7.1.3.1 the Appellant is currently not eligible to compete in the Olympic Games or World Athletics Series competitions using his prosthetic blades, and will not be eligible unless and until he proves that using them does not give him an overall competitive advantage over non- blade users; and*
> >
> > *7.1.3.2 in the meantime, the Appellant is eligible to compete using the blades in international competitions other than the Olympic Games and World Athletics Series competitions, but with his results listed separately from his competitors' results; and*

7.1.4 to order the Appellant to pay the arbitration costs falling within CAS Code Article R64.4, including reimbursing World Athletics for the 21,000 Swiss francs that it has been required to advance (and any further monies that it may be required to advance) on account of such costs".

255. Following the conclusion of the hearing, the IAAF submitted an amended request for relief, which provides as follows:

"For the reasons set out above, World Athletics respectfully asks the Panel:

7.1.1 to dismiss the appeal and to decline to grant any of the relief sought by the Appellant;

7.1.3[13] in the alternative, if the Panel finds that it is unlawful for Technical Rule 6.3.4 (ex Competition Rule 144.3(d)) (the ***Rule****) to put the burden on the athlete to prove that his use of the aid in question would not give him an overall competitive advantage over an athlete not using such aid:*

a. in accordance with Rule 2.2 of World Athletics' Rules of Interpretation (and/or the doctrine of severability applicable under Monaco law), to deem the offending words in the Rule ('the athlete can establish (…) that') to be deleted, and to apply and enforce the Rule as if those words were deleted ('6.3 For the purpose of this Rule, the following examples shall be considered assistance, and are therefore not allowed: (…) (4) The use of any mechanical aid, ~~unless the athlete can establish~~ on the balance of probabilities that the use of an aid would not provide them with an overall competitive advantage over an athlete not using such aid'); and

b. to find that World Athletics has to show and has shown that it is more likely than not that the Appellant's use of his prosthetics would provide him with an overall competitive advantage over an athlete not using such prosthetics; and

c. to conclude that, as a result, (1) the Appellant may not use his prosthetics in the Olympic Games or World Athletics Series competitions; and (2) the Appellant may use his prosthetics in international competitions other than the Olympic Games and World Athletics Series competitions, but with his results listed separately from his competitors' results;

7.1.2 in the alternative, to find, by application of Technical Rule 6.3.3 (ex Competition Rule 144.3(c)) that the Appellant may not use his prosthetics in international competitions; and

7.1.3 to order the Appellant to pay the arbitration costs falling within CAS Code Article R64.4, including reimbursing World Athletics for the 21,000 Swiss francs that it has been required to advance (and any further monies that it may be required to advance) on account of such costs".

13 This the numbering as submitted by the IAAF.

VI. JURISDICTION

256. Article R27 of the Code provides as follows:

> *"These Procedural Rules apply whenever the parties have agreed to refer a sports-related dispute to CAS. Such reference may arise out of an arbitration clause contained in a contract or regulations or by reason of a later arbitration agreement (ordinary arbitration proceedings) or may involve an appeal against a decision rendered by a federation or sports-related body where the statutes or regulations of such bodies, or a specific agreement provide for an appeal to CAS (appeal arbitration proceedings)".*

257. Rule 3.1 of the IAAF's Disputes and Disciplinary Proceedings Rules provides:

> *"This Rule 3 relates to any legal dispute of any kind whatsoever arising between World Athletics on the one hand and any Member, Area Association, athlete, athlete support personnel or other person who is subject to the Constitution and/or any of the Rules or Regulations on the other hand, in relation to the Constitution and/or any Rule or Regulation and/or any World Athletics decision or act or omission, howsoever arising, that is not covered by the dispute resolution provisions of the Constitution or any Rules or Regulations (each, a "Dispute"). Subject to, and in accordance with Article 84 of the Constitution, a Dispute shall be submitted to arbitration before the CAS (Ordinary Arbitration Division or Appeal Arbitration Division, depending on the circumstances of the case), to the exclusion of any other court or forum".*

258. Mr Leeper submits that the CAS has jurisdiction over this appeal, which is not disputed by the IAAF. Moreover, the Parties confirmed CAS jurisdiction when signing the order of procedure.

259. The Panel is, therefore, satisfied that it has jurisdiction over this appeal.

VII. ADMISSIBILITY

260. Article R49 of the Code provides in part as follows:

> *"In the absence of a time limit set in the statutes or regulations of the federation, association or sports-related body concerned, or in a previous agreement, the time limit for appeal shall be twenty-one days from the receipt of the decision appealed against".*

261. Rule 60(22) of the IAAF Competition Rules provides that Mr Leeper had *"thirty days in which to file his statement of appeal with CAS starting from the date of communication of the written reasons of the decision to be appealed".*

262. The Appealed Decision was issued on 18 February 2020. The Statement of Appeal was filed nine days later on 27 February 2020.

263. The IAAF has raised no objection to the admissibility of this appeal.

264. The Panel, therefore, confirms that this appeal is admissible.

VIII. APPLICABLE LAW

265. Article R45 of the Code provides as follows:

> *"The Panel shall decide the dispute according to the applicable regulations and, subsidiarily, to the rules of law chosen by the parties or, in the absence of such a choice, according to the law of the country in which the federation, association or sports-related body which has issued the challenged decision is domiciled or according to the rules of law the Panel deems appropriate. In the latter case, the Panel shall give reasons for its decision".*

266. Article 187 of the Swiss Private International Law Act, which provides that *"the arbitral tribunal shall rule according to the law chosen by the parties".*

A. The parties' submissions concerning the applicable law

267. It is common ground that the applicable regulations here include the IAAF's Constitution and the IAAF rules and regulations. The parties disagree however about which version of the relevant IAAF rules and regulations is applicable to this appeal. As a consequence of that disagreement, the parties also disagree about the precise extent and manner in which the law of Monaco is applicable. There is also disagreement as to the applicability of the IOC Charter and, in particular, whether the IAAF is subject to *"The Fundamental Principles of Olympism"* as set out in the Olympic Charter and, in particular, the principle that *"The practice of sport is a human right. Every individual must have the possibility of practising sport, without discrimination of any kind and in the Olympic spirit, which requires mutual understanding with a spirit of friendship, solidarity and fair play".*

268. Mr Leeper submits that the applicable IAAF rules and regulations are those which were in force at the time of the Application, namely the IAAF Competition Rules. In support of this submission, Mr Leeper cites Rule 2.8.3 of the current World Athletics Rules of Interpretation, which provides that:

> *"Unless expressly specified otherwise, Rules and Regulations (including amendments and supplementary or replacement provisions) shall apply retroactively if they are procedural, but if they are substantive they shall not apply retroactively, but rather only to matters arising after they come into effect. Instead, any matter that is pending as of the date the Rules or Regulations come into effect, and any matter that arises after that date but relates to facts occurring prior to that date, shall be governed by the substantive provisions of the Rules and Regulations in force prior to that date, unless the principle of lex mitior applies".*

269. Rule 60.24 and 60.25 of the IAAF Competition Rules provides:

> *"24. In all CAS appeals involving the IAAF, CAS and the CAS Panel shall be bound by the IAAF Constitution, Rules and Regulations. In the case of any conflict between the CAS rules currently in force and the IAAF Constitution, Rules and Regulation, the IAAF Constitution, Rules and Regulations shall take precedence.*
>
> *25. In all CAS appeals involving the IAAF, the governing law shall be Monegasque law and the arbitrations shall be conducted in English, unless the parties otherwise agree".*

270. Accordingly, by virtue of Rule 60.24 and 60.25 of the IAAF Competition Rules, Mr Leeper submits that the law of Monaco is fully – rather than merely subsidiarily – applicable to this appeal.

271. The IAAF, for its part, submits that the applicable rules and regulations are those which are currently in force, namely the World Athletics Competition Rules, Technical Rules and Disputes and Disciplinary Proceedings Rules (all of which came into force on 1 November 2019). Rule 3.1 of the Disputes and Disciplinary Proceedings Rules provides:

> *"The law governing the Dispute will be the Constitution and Rules and Regulations, with the laws of Monaco applying subsidiarily".*

272. The IAAF submits that, by virtue of this provision and CAS jurisprudence, Monaco law is applicable where necessary to resolve any issues that cannot be resolved solely on the basis of the rules invoked by the parties, namely the relevant rules and regulations of the IAAF. If, however, those rules do address the point in issue, then the rules prevail over any contrary provision of Monegasque law (including any mandatory provisions of law).

273. As to the IOC Charter, Mr Leeper submits that it is applicable and that the IAAF is indeed subject to the *"The Fundamental Principles of Olympism"* (as described above) and that the IAAF must have regard to the principle (No.4) that *"The practice of sport is a human right. Every individual must have the possibility of practising sport, without discrimination of any kind and in the Olympic spirit, which requires mutual understanding with a spirit of friendship, solidarity and fair play".*

274. The IAAF, for its part, does not accept that it is bound by the IOC Charter generally or *"The Fundamental Principles of Olympism"* in particular. The IAAF submits that its own Constitution provides the same measure of protection by virtue of Article 4.1(j) which provides as follows: *"The purposes of the IAAF are to preserve the right of every individual to participate in Athletics as a sport, without unlawful discrimination of any kind undertaken in the spirit of friendship, solidarity and fair play".*

B. The Panel's conclusions regarding the applicable law

275. The Panel notes that the terms of the relevant rules governing the use of mechanical aids are materially identical under the IAAF Competition Rules and the WA Technical Rules. The Panel further notes that while the IAAF Competition Rules were in force on the date when Mr Leeper filed his Application to the IAAF, those rules were replaced by the WA Technical Rules on 1 November 2019. Accordingly, the IAAF's decision to refuse Mr Leeper's Application, and Mr Leeper's appeal to the CAS regarding that decision, both occurred several months after the WA Technical Rules superseded the IAAF Competition Rules.

276. As explained below, in this appeal the Panel is required to undertake a *de novo* determination of Mr Leeper's eligibility to compete while using his RSPs. In other words, the Panel is not confined to conducting a backward-looking review of the IAAF's decision on Mr Leeper's Application. Instead, the Panel is mandated to make its own free-standing assessment of Mr

Leeper's current eligibility to compete based on the evidence as it stands today. The Panel is also required to determine the validity of the rule which imposes a burden on Mr Leeper to establish that he derives no overall competitive advantage from his RSPs. In this regard, Mr Leeper's amended request for relief invites the Panel to rule that, *"The requirement in IAAF Technical Rule 6.3.4 (former IAAF Competition Rule 144.3(d)) (…) is an unlawful discrimination as applied to disabled persons, and is therefore invalid and unenforceable as applied to Mr Leeper"*. The IAAF's amended request for relief likewise invites the Panel to make findings in relation to *"Technical Rule 6.3.3 (ex Competition Rule 144.3(c))"*. It is clear, therefore, that both parties have expressly requested the Panel to determine the validity of the relevant rule as it is in force today (rather than confining itself to determining the validity of the rule that was in force at the date of the Application).

277. As to the IOC Charter, it provides that any member of the *"Olympic Movement"* is bound by the Charter, and it is said that the international federations (or "IFs", of which the IAAF is one) are one of the three main constituents of the Olympic Charter (see Rule 1). The IOC Charter also provides: (a) by Rule 1.4, that *"Any person or organisation belonging in any capacity whatsoever to the Olympic Movement is bound by the provisions of the Olympic Charter and shall abide by the decisions of the IOC"*; and (b) by Rule 25, that *"The statutes, practice and activities of the IFs within the Olympic Movement must be in conformity with the Olympic Charter"*. Had it been necessary for the purposes of this Award, the Panel would have been minded to conclude that the IAAF, by virtue of its participation in the Olympic Movement, is bound by the IOC Charter and bound, in particular, by the fundamental principle that: *"The practice of sport is a human right. Every individual must have the possibility of practising sport, without discrimination of any kind and in the Olympic spirit, which requires mutual understanding with a spirit of friendship, solidarity and fair play"*.

278. It is, however, not necessary to do so because the IAAF squarely accepts that it is bound by Article 4.1(j) of its own Constitution *"to preserve the right of every individual to participate in Athletics as a sport, without unlawful discrimination of any kind undertaken in the spirit of friendship, solidarity and fair play"*, which, so accepts the IAAF, is to same effect as the IOC Charter in proscribing unlawful discrimination. Whether or not, therefore, the IAAF is bound by the IOC Charter has no material effect on the outcome of this appeal.

279. For these reasons, the Panel concludes that the applicable law is the IAAF Constitution, and the WA Competition Rules, Technical Rules and Disputes and Disciplinary Proceedings Rules in force from 1 November 2019, with the law of Monaco applying subsidiarily. Although there is some dispute between the parties as to what exactly is entailed by the subsidiary application of Monegasque law, this does not have any material bearing on the Panel's conclusions and reasoning below.

IX. THE IAAF COMPETITION RULES/WA TECHNICAL RULES

280. Rule 144.2 of the IAAF Competition Rules provides:

> *"Any athlete giving or receiving assistance from within the competition area during an event (including under Rule 163.14, 163.15, 230.10 and 240.8) shall be warned by the Referee and advised that, if there is any repetition, he will be disqualified from that event".*

281. Rule 6.2 of the WA Technical Rules is expressed in materially identical terms.

282. The term *"assistance"* as used in Rule 144.2 is then defined by Rule 144.3. That rule is headed *"Assistance not Allowed"* and provides:

> *"For the purpose of this Rule, the following examples shall be considered assistance, and are therefore not allowed:*
>
> *(a) Pacing in races by persons not participating in the same race, by athletes lapped or about to be lapped or by any kind of technical device (other than those permitted under Rule 144.4(d)).*
>
> *(b) Possession or use of video recorders, radios, CD, radio transmitters, mobile phone or similar devices in the competition area.*
>
> *(c) Except for shoes complying with Rule 143, the use of any technology or appliance that provides the user with an advantage which he would not have obtained using the equipment specified in, or permitted by, the Rules.*
>
> *(d) The use of any mechanical aid, unless the athlete can establish on the balance of probabilities that the use of an aid would not provide him with an overall competitive advantage over an athlete not using such aid.*
>
> *(e) Provision of advice or other support by any official of the competition not related to or required by his specific role in the competition at the time (e.g., coaching advice, indication of the take-off point in a jumping event except to indicate a failure in Horizontal Jumps, time or distance gaps in a race etc.).*
>
> *(f) Receiving physical support from another athlete (other than helping to recover to a standing position) that assists in making forward progression in a race".*

283. Rule 6.3 of the WA Technical Rules is in materially identical terms.

284. The guidance to Rule 144 of the IAAF Technical Rules states:

> *"Rule 144 has been the subject of constant change in recent years to reflect the way in which athletics is conducted, to respect the role of coaches, to manage innovation and new products, etc. The IAAF will continue to respond to new products and trends as soon as they become common place during events and competitions.*

Changes to these Rules are designed to facilitate the athletes' participation in the competition as much as possible and to reduce unnecessary conflict between athletes/coaches and the officials. Each of these Rules should be interpreted in this light whilst always ensuring the competition is conducted fairly to all".

285. The guidance to Rule 6 of the WA Technical Rules is in materially identical terms.

286. Rule 132.3 of the IAAF Competition Rules provides:

"Where the applicable regulations for a competition other than under Rule 1.1(a) permit the simultaneous participation of athletes:

(a) competing with the assistance of another person, i.e. a guide runner; or

(b) using a mechanical aid which is not authorised under Rule 144.3(d);

their results shall be listed separately and, where applicable, their para classification shown".

287. Rule 25.3 of the World Athletic Competition Rules is in materially identical terms.

X. STANDARD OF REVIEW

288. Article 57 of the CAS Code provides:

"The Panel has full power to review the facts and the law. It may issue a new decision which replaces the decision challenged or annul the decision and refer the case back to the previous instance".

289. The IAAF submits that, by virtue of this provision, the CAS Panel is not restricted to deciding whether the decision under appeal is wrong. Instead, it envisages a full *de novo* hearing of the merits of the case. Accordingly, criticisms of the procedure followed below are irrelevant (citing CAS 2016/A/4648, CAS 2012/A/2913). Mr Leeper did not dispute this.

290. Accordingly, in accordance with Article 57 of the CAS Code, the Panel shall conduct a *de novo* hearing of Mr Leeper's right to compete using his RSPs under the relevant rules in force at the date of this Award.

XI. MERITS

A. Introduction

291. On the basis of the parties' amended requests for relief and the submissions advanced before the Panel in writing and at the hearing, the following issues arise regarding the construction, validity and application of the Rule:

1.) What is the proper construction of the Rule?

2.) Is the provision in the Rule which imposes the burden on the athlete to establish the absence of any overall competitive advantage valid and lawful?

3.) In light of the answer to Issue 2 and the evidence before the Panel, is Mr Leeper entitled to compete in IAAF-sanctioned events using his RSPs?

1) Issue 1: What is the proper construction of the Rule?

292. In order to determine the validity and effect of the Rule, it is first necessary to determine exactly what the Rule means. As noted above, the Rule provides that (together with Rule 144.2 for contextual sense):

> *"Any athlete giving or receiving assistance from within the competition area during an event (including under Rule 163.14, 163.15, 230.10 and 240.8) shall be warned by the Referee and advised that, if there is any repetition, he will be disqualified from that event".*
>
> *"For the purpose of this Rule, the following examples shall be considered assistance, and are therefore not allowed: (…).*
>
> *The use of any mechanical aid, unless the athlete can establish on the balance of probabilities that the use of an aid would not provide him with an overall competitive advantage over an athlete not using such aid".*

293. At the Panel's request, the parties made submissions on the proper construction of the Rule (it is common ground that prosthetic limbs are a mechanical aid for the purposes of the Rule).

294. Mr Leeper submitted that the Rule requires a comparison to be undertaken between the disabled athlete who wishes to use a mechanical aid (in this case Mr Leeper) and an able-bodied athlete who is not using such an aid. It does not require a comparison between the athlete who wishes to use the mechanical aid and the performance that same athlete would be capable of achieving if (hypothetically) they had intact biological legs. According to Mr Leeper, the construction of the Rule he advocates is consistent with the natural meaning of the text of the Rule and reflects the fact that it is impossible to know how Mr Leeper (or any other amputee athlete) would perform if he had intact biological legs.

295. When Mr Leeper's counsel was pressed by the Panel on exactly who the able-bodied comparator should be for the purposes of this comparative exercise, he replied that the athlete wishing to use the prosthetic aid should be tested and their performance while using the prosthetic aid should be measured *"against the people he will compete against, which are other elite athletes"*. When he was asked whether this meant that an athlete would not be deemed to have an overall competitive advantage unless they were faster than all other elite athletes, counsel did not provide a direct answer. Instead, he stated that the Rule would require a close analysis of *"all the different elements of running"*. He was unable, however, to provide a clear explanation of how one would go about determining whether a disabled athlete using RSPs has an overall competitive advantage compared with *"other elite athletes"* who do not use such aids.

296. The IAAF, for its part, submitted that the Rule has only one logical and workable interpretation, namely a requirement to assess the likely performance that the disabled athlete would achieve while using the mechanical aid in question and to compare this with the performance the same individual would have been able to achieve if they had intact biological legs (and hence no need to use a mechanical aid to overcome any disability). The IAAF recognized that there was a degree of tension between the wording of the Rule and the interpretation of it advocated by the IAAF. The IAAF submitted, however, that this interpretation flowed inexorably from the underlying purpose of the Rule – namely to protect the integrity and fairness of competitive athletics by preventing athletes from using mechanical aids that do more than merely compensate for the effects of a disability – and is the only construction that is capable of being applied fairly and effectively in practice. No other interpretation would give effect to the clear underlying object and purpose of the Rule. This was said to be the proper construction of the Rule despite the fact that this is not, in terms, what the IAAF had said in the Rule.

297. As a matter of first principles, the approach to the proper construction of the Rule is as follows: (a) the Panel should endeavour to discern the meaning of the Rule by reference to the natural and ordinary meaning of the words used in the context and circumstances in which they are used; (b) the Rule should be construed purposively, *i.e.* to give effect to the purpose of the rule (if readily identifiable); (c) if there is any doubt or ambiguity in the wording used, the Rule should be construed against the IAAF on the basis that it is the drafter of the Rule – especially so in these circumstances where the evidence shows that the Rule was constructed to address, in particular, the issue of the participation in able-bodied athletic events by disabled athletes using prosthetic limbs. This approach is in accordance with established CAS jurisprudence (see *e.g.* CAS 2017/A/5006).

298. As to context, the Panel notes that the Rule, whether called a *"Competition Rule"* as per the 2018-2019 IAAF Rules or a *"Technical Rule"* as per the November 2019 WA Technical Rules, is in the ordinary course to be administered (a) in the competition area and (b) by the referee. In the ordinary course therefore if the referee decides an athlete has received assistance of a type that is not allowed (as set out in Rule 144) then the referee shall in the first place warn the athlete and advise the athlete that if there is any repetition (*i.e.* of the athlete using the assistance) then the athlete will be disqualified. It does not say so in terms, but this likely means that, in the event of repetition, the referee is authorised to disqualify the athlete. All of this takes place in the competition area and all at the time of the event.

299. It will be immediately apparent therefore that the quotidian application of the Rule in relation to mechanical aids is ill-suited to this process. How would a referee form a view as to the quality of assistance rendered by a mechanical aid? How would an athlete, if subject to a burden that he or she should establish that the aid does not provide an overall competitive advantage, go about demonstrating that to the referee? These questions are difficult with respect to any mechanical aid, yet it is almost impossible to understand how they might be answered where the mechanical aid is, as in this case, in the nature of a prosthetic aid.

300. For present purposes, however, the Panel is being asked to determine the application of the Rule in the context of an anterior application (*i.e.* well before entering the competition area) such that these practical difficulties can be set to one side and the task becomes the proper construction of the Rule at some remove (it does, however, underscore the obvious desirability of a rule that is specifically tailored to the use of prosthetic aids by athletes).

301. There is no doubt that the Rule requires a comparison to be undertaken for the purpose of determining whether an athlete who wishes to use a particular mechanical aid would derive an *"overall competitive advantage"* through the use of that aid. The exact nature of the comparative exercise envisaged by the terms of the Rule is, however, unclear. Three particular areas of obscurity stand out.

302. First, the Rule refers to an athlete's use of *"an aid"*, rather than "the aid" or "such an aid". The Rule is concerned with whether the use of a particular mechanical aid by a particular individual athlete should be permitted. In this context, the generic expression *"an aid"* is clearly inapposite. During the hearing, both parties therefore agreed that the expression *"an aid"* must in reality mean "that aid".

303. Second, the expression *"overall competitive advantage"* – a central element and touchstone of the Rule – is not explained or defined anywhere. This is problematic. In particular, the concept of a *"competitive advantage"* is amenable to different interpretations. On one view, for example, any athlete who is naturally more gifted than another athlete could be said to enjoy an overall competitive advantage over that other athlete. On that view, an inferior athlete who uses a mechanical aid to reduce, but not wholly eliminate, their natural inferiority would not derive an *"overall competitive advantage"* by virtue of their use of the mechanical aid. On another view, however, any mechanical aid that enables an athlete to achieve a performance that is better than the performance they could achieve without the aid could be said to confer an *"overall competitive advantage"* on that athlete (since the overall competitiveness of the athlete is enhanced as a direct result of their use of the aid) even though it does not enable the athlete to, for example, run faster than any other athlete.

304. Third (and relatedly), on the literal terms of the Rule, the determination of whether an athlete has an *"overall competitive advantage"* for the purposes of the Rule would require a comparison to be undertaken between the athlete who intends to use the mechanical aid and *"an athlete not using such aid"*. In other words, it would entail a comparison between the likely performance of the athlete using the mechanical aid and the performance of a *different individual athlete* who is not using such an aid. This gives rise to a number of conceptual and practical difficulties. How is that different individual athlete ("the comparator athlete") to be identified? Is the comparator athlete a real person, or a hypothetical construct? If the former, how does one determine which real person should serve as the comparator athlete? In particular, should the comparator athlete be the best athlete in the world in the particular event under consideration (*e.g.*, the fastest 400m runner), or should it be someone else? If the comparator athlete is a real person who is not the best athlete in the world, how is the appropriate non-best athlete to be selected? Alternatively, if the comparator athlete is a hypothetical construct rather than a real person, how does one

determine which physical and performance attributes that hypothetical construct should be imbued with?

305. The unsatisfactory and ambiguous wording of the Rule does not provide any clear answers to these important questions.

306. In these circumstances, the Panel considers that the interpretation of the Rule must be informed by the overarching object and purpose of the Rule, and by the need to ensure that the Rule is not interpreted in a way that gives rise to consequences which are absurd or unworkable. The Panel makes the following observations in this regard.

307. First, the Rule cannot have been intended to require a direct comparison to be undertaken between the athlete seeking to use a mechanical aid and the best athlete in the world in the event in question. It would make no sense to have a rule which permits any athlete of any level of natural ability to use any performance-enhancing mechanical aid provided that their performance while using that aid does not exceed the performance of the very best athlete in the world. A rule which permitted the use of any performance-enhancing aid so long as the user could not outperform the very top athlete in the world would be illogical, arbitrary and absurd.

308. Second, it would equally make no sense to require a direct comparison between the performance of an amputee athlete using prosthetic aids and the likely performance of that same amputee athlete if they attempted, say, to "run" on their stumps without the use of any prosthetic aid. Such a rule would be equally illogical, arbitrary and absurd, since it would automatically preclude all amputees from competing using any prosthetic aids irrespective of the performances they were actually capable of achieving while using such aids.

309. Third, a rule which required a comparison to be undertaken between the likely performance of a disabled athlete using RSPs and the likely performance of a different (real or hypothetical) able-bodied athlete not using such RSPs would be illogical and arbitrary unless there was a principled, objective and consistent basis for determining the identity/attributes of that able-bodied comparator. The Rule does not establish any such basis for identifying a suitable real able-bodied comparator; nor is the Panel able to conceive of such a basis.

310. Having regard to these factors, the Panel concludes that the only logical, principled and workable construction of the Rule is one that, in the case of disabled athletes who use a mechanical aid to overcome a disability, requires a comparison to be undertaken between the athlete's likely athletic performance when using the mechanical aid and their likely athletic performance had they not had the disability which necessitates the use of that aid. A disabled athlete who uses a mechanical aid which does no more than offset the disadvantage caused by their disability cannot be said to have an *"overall competitive advantage"* over a non-disabled athlete who is not using such an aid. In such a case, the mechanical aid does no more than counteract a disadvantage which the able-bodied athlete does not share. Conversely, a disabled athlete who uses a mechanical aid which does not merely offset the disadvantage caused by their disability, but enables the athlete to achieve better overall performances than they would have achieved had not had that disability, can be said to have an *"overall competitive advantage"*.

311. Accordingly, the Panel concludes that the question whether a particular disabled athlete will derive an *"overall competitive advantage"* through the use of a mechanical aid can only be answered by comparing (a) the performance that the athlete is actually capable of achieving while running with their disability and their mechanical aid; and (b) the performance they would hypothetically have been capable of achieving in the same event if they were running without that disability and without that aid.

312. In the circumstances, the Panel therefore considers that the only logical and workable construction of the Rule is one that requires a comparison to be undertaken between (a) Mr Leeper's performance in the 400m event while using his RSPs to overcome his lack of fully intact biological legs; and (b) Mr Leeper's likely performance in the 400m event had he been born with fully intact biological legs which did not necessitate the use of RSPs in order to run. The Panel notes, in passing, that this is indeed the comparison that Dr Grabowski's study sought to undertake by comparing Mr Leeper's 400m performance on RSPs with his likely 400m performance if he had been born with intact biological legs.

313. Accordingly, the Panel is of the view that, as it is currently framed as it applies to Mr Leeper, the Rule prohibits Mr Leeper from using his RSPs to compete in events against able-bodied athletes unless he establishes on a balance of probabilities that his performance in the 400m event while using those RSPs is no faster than his performance in the same event would have been if he had intact biological legs.

2) Issue 2: Is the Rule valid and enforceable?

314. The second issue in this appeal is also a legal one. It is common ground that the language of the Rule places the burden on an athlete such as Mr Leeper who wishes to use a mechanical aid to establish that the use of that aid would not provide them with an overall competitive advantage. The parties disagree, however, about the legality of the Rule. They also disagree about which side bears the burden of proof in relation to this contested legal issue. Does Mr Leeper bear the burden of establishing that the Rule is unlawful? Or is the burden on the IAAF to prove that it is lawful? Before examining the legality of the Rule itself, therefore, the Panel must determine which party bears the burden of proof in relation to this issue.

A. Which party bears the burden of proving the lawfulness/unlawfulness of the Rule?

315. In the Panel's view, the answer to this first question depends on whether or not the Rule is discriminatory. The Panel notes that it was common ground in CAS 2014/A/3759 and CAS 2018/O/5794 & CAS 2018/A/5798 that the party seeking to challenge an allegedly discriminatory regulation bears the burden of establishing that the rule discriminates on the basis of a protected ground. It was also common ground in those cases that, if the regulation did so discriminate, the burden of proof shifted to the IAAF to establish that the regulation was necessary, reasonable and proportionate. The Panel concludes that the same approach should logically apply in a case where it is alleged that a regulation promulgated by the IAAF discriminates unlawfully against athletes with disabilities.

316. On its face, the Rule applies equally to all athletes; it draws no distinction between able-bodied athletes and athletes with a disability. Any athlete who wishes to use any form of mechanical aid during a race for any reason is required to prove that the use of that mechanical aid will not provide them with a competitive advantage. In this regard, the Rule is qualitatively different to the eligibility rules that were the subject of the challenge in CAS 2014/A/3759 (which expressly applied only to female athletes) and in CAS 2018/O/5794 & CAS 2018/A/5798 (which expressly applied only to athletes who were recognised at law as female or intersex) and which in both cases expressly imposed eligibility restrictions on a subset of those female/intersex individuals on the basis of certain biological characteristics possessed by those individuals. In light of the fact that the regulations only applied to certain female or intersex athletes and imposed restrictions on those individuals which were not imposed on either male athletes or female/intersex athletes who lacked the specified biological characteristics, the CAS Panels in CAS 2014/A/3759 and CAS 2018/O/5794 & CAS 2018/A/5798 held that the regulations were *prima facie* discriminatory and, therefore, the onus was on the IAAF to establish their validity. This conclusion was reached by reference to the anti-discrimination provisions in the IAAF's Constitution and the IOC Charter, and did not turn on the application of any international human rights instrument or any provision of Monegasque law.

317. In the present case, the Rule applies to all athletes and does not expressly subject any particular category or class of athletes to differential treatment. It is, however, common ground that the Rule was introduced in its current form to deal with the particular issue of disabled athletes who wish to use mechanical aids to enable them to compete against able-bodied athletes notwithstanding their disability. In other words, although the provisions of the Rule apply to all athletes who wish to use mechanical aids during IAAF-sanctioned competitions, the Rule was enacted with the specific objective of regulating the ability of athletes with disabilities to participate in IAAF-sanctioned competitions while using mechanical aids to overcome the limitations that arise as a result of their disabilities.

318. The Panel also notes that while the Rule is neutral on its face (in the sense that it applies to all athletes equally and irrespective of any disability) the practical effect of the Rule is likely to be significantly greater for disabled athletes than able-bodied athletes. This is because the vast majority of able-bodied athletes – who significantly outnumber athletes with disabilities – do not require the use of any mechanical aid in order to participate in competitive events at IAAF-sanctioned competitions and are therefore unaffected by the Rule. In contrast, any amputee athlete who wishes to participate at IAAF-sanctioned events in circumstances that enable their results to be ranked alongside able-bodied athletes is directly affected by the Rule, and must discharge the burden of establishing that their prosthetic limbs do not provide them with an overall competitive advantage (so, too, are other non-amputee disabled athletes who require mechanical aids in order to enable them to compete in IAAF-sanctioned track and field events). Accordingly, while not directly discriminatory on its face, in its practical application the Rule is likely to affect a larger number and a much greater proportion of disabled athletes than able-bodied athletes. In reality, the practical weight of the Rule is borne largely or exclusively by disabled athletes.

319. In these circumstances, the Panel concludes that the Rule is indirectly discriminatory. The Panel notes in this regard that while the IAAF's Constitution does not specifically refer to the concept of indirect discrimination, the terms of Article 4.1(j) of the Constitution (which refers to *"the right of every individual to participate in Athletics as a sport, without unlawful discrimination of any kind"*) are broad enough to encompass a prohibition of both unlawful direct discrimination and unlawful indirect discrimination. The Panel understands the IAAF to accept that any rule or regulation enacted by the IAAF which is incompatible with the IAAF Constitution is invalid.

320. In addition to relying on the anti-discrimination provisions in the IAAF Constitution, Mr Leeper also relies on the CRPD and the ECHR. The IAAF submits that neither of those international instruments is applicable to the present case. In particular, the IAAF submits that the CRPD and ECHR only apply to State Parties and public authorities exercising State powers, and do not apply to private bodies which are not exercising such powers. The Panel accepts that the CRPD and ECHR are international treaties which are directed towards, and binding upon, State Parties and do not impose obligations on purely private bodies. The materials before the Panel do not establish that under Monegasque law the IAAF itself owes any obligations to Mr Leeper by virtue of either the ECHR or the CRPD. In this regard, the Panel notes the observation of the CAS Panel in CAS 2011/A/2426 that, *"international treaties on human rights are meant to protect the individuals' fundamental rights vis-à-vis governmental authorities and, in principle, they are inapplicable per se in disciplinary matters carried out by sports governing bodies, which are legally characterized as purely private entities"*. While the present appeal does not concern a "disciplinary matter", the Panel considers that those observations are equally applicable to the Appellant's reliance on the ECHR and CRPD in this case.

321. While the Panel has concluded that neither the ECHR nor the CRPD is directly applicable in this case, this conclusion does not materially affect the outcome of the Panel's analysis of the challenge to the lawfulness of the Rule. This is because, as explained above, the Panel has concluded that the Rule is indirectly discriminatory and therefore engages Article 4.1(j) of the IAAF Constitution. Applying a similar approach to that applied by the CAS Panels in CAS 2014/A/3759 and CAS 2018/O/5794 & CAS 2018/A/5798, it follows that the IAAF therefore bears the burden of establishing that the Rule is a necessary and proportionate means of attaining a legitimate objective. If the IAAF is unable to discharge that burden, then the Panel must declare the Rule to be invalid.

B. Does the Rule pursue a legitimate objective?

322. As noted above, the IAAF submits that there are compelling reasons of principle as well as good practical reasons for placing the burden on the athlete who seeks permission to use a mechanical aid to demonstrate that they do not derive an overall competitive advantage through the use of that aid. In particular, the IAAF submits that the Rule is intended to, and does in fact, ensure the fairness and integrity of competitive athletics by preserving a level playing field – objectives which the IAAF submits it is entitled and required to pursue as part of its function as the international governing body of the sport of athletics.

323. It does not appear to be in dispute – nor could it sensibly be contested – that the general objective of ensuring fairness and integrity of competition in elite competitive sport is a legitimate objective for an international sports governing body to pursue. The Panel recognises that the concepts of *"fairness"*, *"competitive integrity"* and a *"level playing field"* may sometimes be difficult to elucidate or define with precision in the context of competitive sport, and that reasonable minds may sometimes differ as to whether particular matters do or do not undermine fairness/integrity in particular sports. The use of certain technology to augment a competitor's performance may be regarded as a threat to fairness and integrity in some sports, but not in others. Within a particular sport, different stakeholders may hold divergent views about whether, and if so to what extent, particular matters undermine or protect fair competition and the preservation of a level playing field.

324. In this regard, the Panel is mindful that by virtue of their status, expertise and responsibility for protecting and reconciling the interests of all stakeholders in a particular sport, international governing bodies enjoy a margin of appreciation in determining what factors are relevant to ensuring the fairness and integrity of the sport in question and what regulatory measures are necessary in order to achieve this. At the same time, the Panel notes that the margin of appreciation afforded to governing bodies is not unlimited, and that careful scrutiny is called for where (as here) measures taken by a governing body are directed towards, and have a disparate impact on, individuals with disabilities or other particular protected characteristics.

325. Having regard to its margin of appreciation, the Panel considers that an international sports governing body such as the IAAF is legitimately entitled to take the view that fairness requires that the outcome of competitive athletics should be determined by natural physical talent, training and effort, and that athletes should not be able to use artificial technology during competitions in a way that provides them with an overall advantage over athletes who are not using such technology. The Panel considers that this is particularly so where (as here) the mechanical aid is one that most athletes would not, in practice, be able to utilise.

326. At the same time, the Panel is mindful that in the case of disabled athletes such as Mr Leeper, without the use of mechanical aids they would be unable to participate at all in IAAF-sanctioned events in circumstances that would enable their results to be ranked alongside their fellow able-bodied competitors. A rule which was specifically designed to *prevent* disabled athletes from competing in IAAF-sanctioned events could not be said to pursue a legitimate objective.

327. In his submissions before the Panel, Mr Leeper argued forcefully that the Rule had indeed been enacted for the specific purpose of preventing disabled athletes such as him from competing in IAAF-sanctioned events against other able-bodied athletes. In support of that submission, he pointed to various comments recorded in minutes of meetings of the IAAF Council and IAAF committees which, he submitted, revealed an intention to exclude disabled athletes from competing with prostheses against able-bodied athletes. Mr Leeper argued that the documentary evidence reflected a clear animus against disabled athletes, and showed that the IAAF had exhibited a strong and concerted desire to exclude amputees from competing against able-bodied athletes irrespective of the underlying scientific evidence. Mr Leeper submitted that the imposition of the burden of proof on disabled athletes under the Rule was intended to advance

the IAAF's discriminatory agenda by rendering it practically impossible for a disabled athlete such as him to gain authorisation to compete against able-bodied athletes in IAAF-sanctioned events, while at the same time concealing the IAAF's discriminatory motive under the guise of a facially neutral burden of proof. He added that the IAAF could have refuted this claim by adducing witness evidence from a participant in the relevant deliberations that culminated with the enactment of the Rule, but had tellingly chosen not to do so. He also drew attention to the comments of the CAS Panel in the CAS 2008/A/1480 case, which he submitted provided further objective proof of the IAAF's longstanding and entrenched discrimination against amputee athletes.

328. The IAAF strenuously denied that there is any evidence of any discriminatory intent against disabled athletes. The IAAF submitted that the evidence cited by Mr Leeper was cherry-picked and taken out of context and that, when properly analysed and assessed in the full context, the relevant minutes and documents revealed nothing more than a proper and responsible concern to preserve the integrity of competitive athletics. The IAAF submitted that it has a proud history of facilitating the inclusion of athletes with disabilities, pointing out that there are currently 18 disabled athletes (including four bilateral leg amputees) participating in IAAF-sanctioned events.

329. The Panel has carefully considered the evidence relied on by each of the parties on this issue. On the basis of that review, it is apparent that the materials relied on by Mr Leeper are, when viewed in their fuller context, more nuanced than he submits. It is clear that the question of how the use of prosthetic running aids by amputee athletes should be regulated was a matter of significant concern, discussion and debate within the IAAF. The views of some contributors to that debate were expressed with force and vigour. This is perhaps unsurprising given the importance of the issue and the strong feelings which had been expressed by various stakeholders in the sport (including athletes). Having read the relevant internal IAAF documents, however, the Panel does not consider that the contemporaneous evidence establishes that the Rule was enacted for an improper discriminatory purpose.

330. Although the Panel does not accept Mr Leeper's submission that the Rule was the result of an improper discriminatory agenda against disabled athletes, the Panel does note that the IAAF's discussions surrounding the enactment of the Rule were mainly focussed on the perceived potential negative implications of disabled athletes competing with prosthetic aids against able-bodied athletes, with little or no discussion of how the participation of such disabled athletes could be facilitated without compromising fairness. It is apparent to the Panel that the rights and legitimate interests of disabled athletes were, at best, a secondary consideration in the IAAF's regulatory decision-making. The apparent lack of attention and concern regarding the impact of the Rule on the rights and interests of disabled athletes is regrettable and may explain the IAAF's failure to recognise the unnecessary and disproportionate character of the Rule.

331. In addition, it is notable that, although the IAAF could have enacted a bespoke rule to deal specifically and directly with the position of disabled athletes who need to use prosthetic aids as a substitute for missing biological limbs, it elected not to do this and instead sought to shoehorn such athletes into a wider rule concerned with the use of mechanical aids in general.

While the Panel does not consider that this choice constitutes evidence of a discriminatory intent, when viewed in conjunction with the problematic drafting described above, this reinforce the Panel's clear impression that the drafting and consequences of the Rule were not as carefully thought through as they ought to have been given their implications for disabled athletes.

332. Having carefully considered the totality of the evidence adduced by the parties, however, the Panel does not find that the Rule was created with the specific intention to prevent disabled athletes such as Mr Leeper from competing in competitive athletics against able-bodied athletes. Rather, the preponderance of the evidence indicates that the Rule was intended to pursue the legitimate objective of ensuring the fairness and integrity of competitive athletics by ensuring that the outcome of IAAF-sanctioned competitions is determined by competitors' natural talent, training and effort, and not by the use of mechanical aids which confer an artificial competitive advantage over athletes who are not using such aids.

333. On the evidence, the Panel is satisfied that the aim of the Rule – and in particular the aspect of the Rule that places the burden on the athlete who wishes to use a mechanical aid to demonstrate the absence of a competitive advantage – is to ensure that where a disabled athlete requires a prosthetic aid in order to participate against able-bodied athletes in a particular event, the use of that aid does not enable the disabled athlete to achieve performances that are better than they would be able to achieve if they did not have the disability at all. In other words, the Rule is intended to (a) permit disabled athletes to compete against able-bodied athletes while using mechanical aids that *compensate* for the effect of their disability, but (b) to prevent disabled athletes from competing against able-bodied athletes that do *more* than compensate for the effect of their disability. The Panel considers this to be a legitimate objective for the IAAF to pursue.

334. This conclusion, however, is not the end of the Panel's enquiry. In order to establish the lawfulness of the Rule, the IAAF must also satisfy the Panel that the Rule is necessary, reasonable and proportionate to that legitimate objective. It is to these questions that the Panel now turns.

C. Is the Rule necessary, reasonable and proportionate?

335. As explained above, the Panel considers that it is legitimate for the IAAF to take the position that disabled athletes should not be permitted to compete using mechanical aids which enable them to achieve athletic performances that exceed the performances they would have been able to achieve otherwise. The next question, therefore, is whether the Rule is a necessary, reasonable and proportionate means of attaining that objective. In particular, does the legitimate aim pursued by the IAAF require it to adopt a rule that places the burden on the disabled athlete to prove they derive no overall competitive advantage from their prosthetic limbs, or could that legitimate aim be pursued in an equally effective way without the athlete having to shoulder the burden of proving the absence of any competitive advantage?

336. In addressing this question, the Panel considers it appropriate to begin by considering whether there is evidence that RSPs enable amputee athletes to achieve better performances in

competitive events than they would be able to achieve if they had intact biological legs. If there is no evidence to this effect, then this would make it extremely difficult (if not impossible) for the IAAF to establish that it is necessary for the Rule to exist in its current form, since there would be nothing to suggest that fair competition was conceivably at risk of being subverted through the use of such mechanical aids.

337. The Panel considers that the evidence presented by the IAAF does establish that there is a likelihood that RSPs enable some amputee athletes to run faster times in the 400m event than they would be able to achieve if they had intact biological legs. The Panel notes, in particular, that the IAAF has adduced unchallenged statistical evidence showing that since 2012 a total of 29 male bilateral transtibial amputee athletes have attained times of under 50 seconds in the 400m event (this being the benchmark for world-class male athletes in this event). Six of those bilateral transtibial amputees have attained times that are faster than 97.8% of all elite 400m runners. Since bilateral transtibial amputees make up a very small fraction of the overall population, the number of transtibial amputees who have run elite times (and top-level elite times) in the 400m event during this period is much higher than would be expected if those athletes' use of RSPs had no effect on their competitive performance. Further, the Panel also notes that, in contrast to athletes with minimum vision impairment and athletes unilateral lower limb amputations, the distribution of 400m athletes with bilateral lower limb amputations has a maximum density at around 46.2 - 46.3 seconds, which is significantly faster than the maximum density for able-bodied 400m athletes (48.5 – 50.5 seconds). Accordingly, the Panel considers that, as in CAS 2018/O/5794 & CAS 2018/A/5798, the significant over-representation of athletes with a particular rare feature or characteristic among the cohort of top elite athletes is a compelling indication that such rare feature or characteristic potentially enhances athletic performance.

338. It follows that the factual premise that underpins the Rule – namely that prosthetic aids could in certain circumstances enable amputee athletes to run faster than they could run if they had fully intact biological legs – is established, at least as a possibility, by the evidence. This conclusion is reinforced and confirmed by the Panel's analysis of the effect of Mr Leeper's RSPs on his athletic performance in the 400m event, which is addressed under Issue 3 below.

339. The mere fact that RSPs may enable some amputee athletes to run faster times than if they had intact biological legs, however, does not automatically lead to the conclusion that it is necessary for the IAAF to impose the burden of proving the absence of any competitive advantage on an athlete who wishes to run with a mechanical aid. Instead, the Panel must examine the specific reasons put forward by the IAAF as to why this shifting of the burden is said to be necessary, reasonable and proportionate.

340. The first reason put forward by the IAAF is that it is fair to require any athlete seeking an exception to the normal eligibility rule to require them to prove that granting the exception sought will not undermine the objectives on which that rule is based. The IAAF submits that it is entitled to proceed on a precautionary basis, by resolving any doubt against the individual seeking an exception to the normal eligibility requirement.

341. In the Panel's view, the reliance on the so-called "precautionary basis" is misplaced. The precautionary principle is this: *"When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically"* (see CAS 2017/A/5114). That is, better safe than sorry. This might have application in the context of horse-doping, but it has little application in the context of this dispute. Having said that, the Panel does accept that there is an analogy to be drawn by between the Rule and the regulations governing TUEs. Athletes who wish to use an otherwise prohibited substance in order to treat or overcome a medical condition are, in some respects, in an analogous position to disabled athletes who wish to use an otherwise prohibited mechanical aid in order to overcome the effects of their disability. Athletes seeking a TUE are required to prove, on a balance of probabilities, that it is *"highly unlikely"* that the use of the substance in question will produce *"any additional enhancement of performance beyond what might be anticipated by a return to the Athlete's normal state of health"*. The rationale for that requirement – namely that athletes who require otherwise prohibited medical support in order to overcome a medical condition should be permitted to do so provided that they can prove this support will not subvert fair competition – could apply to the use of mechanical aids by amputee athletes. On the other hand, the regulations governing TUEs were not specifically enacted with disabled athletes in mind. Unlike the Rule under consideration here, there is nothing to suggest that the TUE regulations have any disparate impact upon disabled athletes.

342. The second reason put forward by the IAAF is that an athlete who wishes to compete while using a mechanical aid controls access to, and is best able to gather and explain, the evidence relevant to the advantages and disadvantages they derive from the use of that mechanical aid. The Panel does not consider this factor to be a particularly persuasive reason for imposing the burden of proof on a disabled athlete. In particular, the Panel notes that if the burden of proof were on the IAAF, the IAAF would have no difficulty in obtaining data regarding the disabled athlete's performance in competitive races (which is a significant strand of the evidence relied on by the IAAF in this case). The Panel also notes that if a disabled athlete refused to undergo any form of testing, or to provide any relevant performance data to the IAAF, then unless there was a reasonable justification for that refusal, that refusal could be considered when determining whether the IAAF had met its burden of proof. In other words, an adverse inference could be taken if an athlete failed to wilfully and reasonably assist the IAAF in this process. Accordingly, the fact that a disabled athlete is best placed to obtain data regarding the effect of a mechanical aid on their athletic performance and competitiveness is not a powerful reason for imposing the burden of proof on such an athlete.

343. On the other side of the scales to the considerations described above, there are a number of factors which the Panel considers lead firmly to the conclusion that it is not necessary, reasonable or proportionate to impose the burden of proof on the disabled athlete under the Rule.

344. First, the Rule imposes an onerous practical burden upon any disabled amputee who (like Mr Leeper) wishes to compete in IAAF-sanctioned events and to have their results listed alongside able-bodied athletes. Such an individual is required, in effect, to prove a negative: namely, that they derive no overall competitive advantage from having prosthetic rather than biological

limbs. As the material presented by the parties in this appeal amply demonstrates, the factual and scientific enquiries necessarily entailed by that requirement are multifaceted and complex. For example, in order to determine whether an amputee sprinter who requires RSPs in order to run derives an overall competitive advantage through the use of those prosthetic limbs, it will typically be necessary to obtain, analyse and present detailed and highly technical scientific evidence concerning metrics such as their biomechanics, acceleration, maximum velocity, sprint endurance, curve-running, running economy and aerobic capacity (and, potentially, other metrics too). It will also be necessary to establish (insofar as this is scientifically possible) how each of those metrics would differ if the individual in question had biological legs rather than prosthetic limbs, and how those actual and hypothetical metrics compare to other able-bodied athletes who compete in the same event.

345. The task of obtaining, analysing and presenting that complex scientific data is likely to be challenging, expensive and time consuming. It is self-evident that a disabled athlete who is affected by the Rule will need to enlist expert assistance in order to have a realistic chance of obtaining the scientific data and expert analysis of that data needed in order to meet their burden under the Rule. Indeed, this is made clear by the letter sent to Mr Leeper on 30 April 2019, which explained that any athlete who wishes to obtain a decision from the IAAF that they are permitted to use a prosthetic aid under the Rule must submit an application to the IAAF which includes *"supporting evidence, including (without limitation): a full description of the research project – the hypotheses addressed, research design, participants, all measures, statistical analyses, results, discussion and conclusions – together with all raw data"*.

346. The IAAF, therefore, recognises that a disabled athlete in Mr Leeper's position is expected to obtain both scientific research data and expert analysis of those data in order to have any realistic possibility of meeting the burden imposed by the Rule.

347. The Panel considers it likely that many, if not most, disabled athletes in that position will not have immediate access to experts with the requisite expertise or to appropriate testing and research facilities that enable such data to be gathered for analysis. The Panel also considers that there is a significant risk that the financial cost of obtaining the relevant data and expert analysis will be prohibitive for many disabled athletes, and therefore they will be unable even to attempt to meet the burden imposed by the Rule unless (as has happened in Mr Leeper's case) they are fortunate enough to secure *pro bono* assistance. Indeed, the UQ Experts, who designed the seven-step protocol which the IAAF imposed on Mr Leeper here, criticised the experiment conducted by Dr Grabowski as being too narrow and suggested that Mr Leeper should have recruited a group of Olympic level runners, fitted them with an orthotic which matched Mr Leeper's RSPs and, *"following a suitable period of familiarisation and training to use the device effectively, the 400m performance of athletes running with and without the prosthetics could be studied in detail, including assessing the detailed biomechanical and physiological effects"*. This was all, apparently, to be arranged and funded by Mr Leeper.

348. Despite the onerous practical burden imposed on a disabled athlete who wishes to compete under the Rule, the IAAF's rules and regulations contain no provisions designed to assist disabled athletes to obtain the evidence required in order to enable a fair and reliable

determination to be made of whether their RSPs give them an overall competitive advantage or not. There is therefore a significant risk that many disabled athletes who do not derive an overall competitive advantage through their use of RSPs will be unable to prove this and hence, through no fault of their own, will be unfairly denied the ability to compete in events against able-bodied athletes despite having no competitive advantage over those athletes. There is also a real risk that disabled athletes will be forced to incur significant financial costs which they are unable to recover from the IAAF even if they succeed in demonstrating that their mechanical aids do not confer any overall athletic advantage. These risks do not apply to able-bodied athletes who do not require mechanical aids in order to compete in the same events.

349. The Panel considers that the significant risk of disabled athletes being unfairly prevented from competing, and the risk that disabled athletes who derive no competitive advantage from their prosthetic aids will be forced to incur irrecoverable expenses in proving this, both weigh heavily in any assessment of the overall necessity, reasonableness and proportionality of the Rule.

350. Second (and no less significantly), the IAAF's rules do not establish any clear, accessible and structured process that must be followed in order to determine whether an individual disabled athlete has met the burden imposed by the Rule. In this regard, it is notable that when Mr Leeper was first notified that the IAAF had decided that he was ineligible to compete because the IAAF considered his RSPs gave him a competitive advantage, there was no defined procedure whatsoever in existence for how Mr Leeper could seek to discharge his burden of disproving that conclusion. Instead, Mr Leeper had to proactively request information from the IAAF concerning the types of information and testing that the IAAF would require in order to assess whether he had discharged the burden of proof under the Rule, how and by whom that evidence would be evaluated, and in what form such evidence and supporting material should be submitted.

351. It was not until eight months later that the IAAF provided Mr Leeper with details of the seven-step process which the IAAF had decided should be followed by an athlete in Mr Leeper's position who wishes to apply for a decision under the Rule permitting them to compete with the help of a particular mechanical aid. That seven-step process is not enshrined in any binding rule or regulation and appears to have been created as a direct reaction to Mr Leeper's understandable request – which was made in the absence of any relevant framework or guidance – for clarification about what was expected of him and how any application under the Rule would be determined.

352. The Panel notes, in this respect, that there is a stark contrast between the Rule and the IAAF's rules concerning the use of running shoes, which are accompanied by prescriptive guidance about how the IAAF will determine whether an athlete is permitted to use a type of shoe that has not previously been used in international competitions. Rule 5.2 of the WA Technical Rules regulates the use of running shoes. It provides (among other things) that a shoe *"must not give athletes any unfair assistance or advantage"*. Rule 5.2.2. provides that *"Where World Athletics has reason to believe that a type of shoe or specific technology may not comply with the letter or spirit of the Rules, it may refer the shoe or technology for detailed examination and it may prohibit the use of such shoes or technology in competition pending examination"*. The *"Note"* that accompanies this rule explains that no later than

four months before the international competition at which an athlete proposes to wear the new model of shoe:

> *"the athlete or their representative must submit to World Athletics the specification (i.e. size, dimensions, sole thickness, structure etc.) of that new shoe; confirm if the new shoe is to be customised in any way; and provide information about the availability of the new shoe on the open retail market (i.e. either in store or online). After reviewing this information World Athletics may request that samples of the shoe be submitted by the manufacturer for further examination. If the shoe is requested for further investigation, World Athletics will use reasonable efforts to complete its examination as soon as practicable (if possible, within 30 days of receipt of the shoe by World Athletics)".*

353. The WA Technical Rules, therefore, establish a clear and accessible process that is to be followed in order to resolve any uncertainty regarding whether a particular new model of shoe does or does not give the wearer any unfair assistance or advantage. The IAAF has not provided any good reason for the absence of any equivalent process or formal guidance in respect of the Rule governing the use of mechanical aids.

354. The Panel further notes that since there is no formally established procedure for determining applications under the Rule, there is no timetable that to which the IAAF must adhere when considering and determining such applications. In this case, it took the IAAF more than seven months to determine Mr Leeper's Application after it was submitted for consideration. During that time, Mr Leeper was not permitted to compete against able-bodied athletes at IAAF events in circumstances that would enable his results to be ranked alongside those athletes. While the Panel appreciates that the scientific evidence is complex, in view of the gravity of the consequences for Mr Leeper and the relative brevity of the ARG's analysis of the Application, the Panel does not consider that the length of time taken to determine Mr Leeper's Application was fair or reasonable. Mr Leeper's case, therefore, demonstrates how the absence of any detailed rules or regulations concerning the process for determining applications under the Rule gives rise to a significant risk of unreasonable delay.

355. Furthermore, the Panel is also struck by the IAAF's failure to comply fully with its own process as outlined in the 30 April letter. According to that letter, at the final stage of the seven-step process, *"The CEO will consider and (if he agrees) pass on the recommendation to the IAAF Council. The IAAF Council will make the final decision in respect of the Application"*. Despite this, it is not in dispute that the chief executive officer of the IAAF did not pass on the recommendation to the IAAF Council, which did not take any decision in respect of the Application. The IAAF's failure to adhere to the process it had devised is a further reflection of the unsatisfactory absence of any formal, binding procedure to be followed under the Rule.

356. Third, the Panel considers that when dealing with a rule that has a substantial disparate impact on disabled athletes, it is neither necessary nor proportionate for any doubt to be resolved against the disabled athlete. In this regard, the Panel is struck by the contrast between the Rule (which imposes the burden of proof on an athlete who wishes to use a mechanical aid to demonstrate that the use of that aid will not give them an overall competitive advantage) and the anterior rule under rule 144.3(c) of the IAAF Competition Rules/rule 6.3.3 of the WA

Technical Rules which prohibits the use of *"any technology or appliance that provides the user with an advantage which he would not have obtained using the equipment specified in, or permitted by, the Rules"*.

357. It is apparent that the burden of proof under that rule rests on the IAAF, rather than on the athlete using the *"technology or appliance"*. It is unclear why a disabled athlete wishing to use a mechanical aid to overcome a disability should bear the burden of establishing the absence of any competitive advantage under the Rule, whereas an athlete who wishes to use a technology or appliance does not bear an equivalent burden. The unexplained disparity between these two provisions reinforces the Panel's conclusion that the burden-shifting provision under the Rule is neither necessary, reasonable or proportionate.

358. Indeed, during the hearing the IAAF argued that if the Rule is declared invalid then rule 144.3(c) of the IAAF Competition Rules/Rule 6.3.3 of the WA Technical Rules should be applied in the alternative. The IAAF made that submission without any explanation as to how that rule concerning the use of *"any technology or appliance"* (which imposed no burden on the athlete) as opposed to the Rule concerning the use of a *"mechanical aid"* (which did impose a burden on the athlete) should be applied in any given circumstance where the assistance in question could fairly, as here, be characterised either as technology or as a mechanical aid. In response to questioning by the Panel, the IAAF submitted that the former rule is *lex generalis* and the latter is *lex specialis*. However, no reasoned explanation was provided for why the burden rests on the IAAF under the general rule but rests on the athlete under the specific rule. The Panel cannot discern any principled reason for this distinction. Indeed, if the Rule concerning the use of mechanical aids is merely a specific sub-set of a broader rule concerning the use of *"any technology or appliance"*, then logic and consistency would both strongly suggest that the burden of proof should be the same under the specific rule as under the general rule.

359. For these reasons, and having due regard to the IAAF's margin of appreciation, the Panel concludes that the Rule is unlawful and invalid insofar as it places the burden of establishing the absence of an overall competitive advantage on the athlete who is seeking to use a mechanical aid.

D. What is the consequence of the Panel's conclusion regarding the unlawfulness of the burden of proof under the Rule?

360. Rule 2.2 of the World Athletics Rules of Interpretation provides:

> *"If any provision or part-provision of any Rules or Regulations is or becomes invalid, illegal or unenforceable, it shall be deemed deleted, but that shall not affect the validity, legality and enforceability of the rest of the Rules or Regulations"*.

361. The Panel concludes that, by virtue of this provision, the part-provision of the Rule which imposes the burden of proof on the disabled athlete (which the Panel has found to be unlawful) shall be *"deemed deleted"* from the Rule. Accordingly, in light of that deemed deletion, the Rule therefore provides:

"For the purposes of this Rule, the following examples shall be considered assistance, and are therefore not allowed: (…).

The use of any mechanical aid, unless [text deleted] *on the balance of probabilities* [text deleted] *the use of an aid would not provide them with an overall competitive advantage over an athlete not using such an aid".*

362. Accordingly, it follows that the IAAF bears the burden under the Rule of establishing that Mr Leeper (or any other disabled athlete who wishes to use prosthetic aids in order to run against able-bodied athletes) derives an overall competitive advantage from the use of the particular prosthetic aid. Indeed, this is common ground.

3) Issue 3: In light of the answer to Issue 2 and the evidence before the Panel, is Mr Leeper entitled to compete in IAAF-sanctioned events using his RSPs?

A. Introduction

363. As explained above, the relevant question is whether Mr Leeper's RSPs enable him to run faster times in the 400m event than he would be able to achieve if he had intact biological legs. In light of the Panel's ruling on Issue 2 above, the IAAF bears the burden of establishing on a balance of probabilities that they do. If the IAAF is unable to discharge that burden, then it will follow that Mr Leeper will, according to the IAAF Rules, be entitled to compete in the 400m event against able-bodied athletes in IAAF-sanctioned competitions (and to have his results ranked alongside those athletes) when using his RSPs.

364. Accordingly, the focus of the Panel's inquiry must be on the evidence which enables Mr Leeper's performance over 400m using his RSPs to be compared with his likely hypothetical performance over the same distance if he had intact biological legs. In undertaking that comparative exercise, the Panel is mindful that Mr Leeper's hypothetical predicted performance if he had intact biological legs is necessarily a matter of informed estimation, rather than the establishment of a scientifically verifiable fact. There is, therefore, an inevitable element of uncertainty in that estimate. For the reasons explained above, any material uncertainty as to whether Mr Leeper derives an overall competitive advantage from his RSPs should be resolved in favour of Mr Leeper.

365. At the outset of its analysis of the evidence, the Panel observes that it would be unusual for a party who has not adduced any positive scientific evidence of their own to be capable of discharging the burden of proving the existence of an overall competitive advantage. In this case, however, the IAAF's experts have been provided with the raw data generated by Dr Grabowski's study of Mr Leeper and have undertaken an analysis of those data and the conclusions that Dr Grabowski and her colleagues have drawn from those data. It is moreover common ground that the experiments which generated those raw data were experimentally sound. As a result, although there are significant disputes between the parties and their experts regarding the conclusions that can properly be drawn from the raw data, there is no dispute as to (a) the contents of the raw data; and (b) the soundness of the process by which those data

were generated. In the unusual circumstances of this case, therefore, the fact that the IAAF has not produced its own scientific data regarding Mr Leeper's performance with RSPs does not itself prevent the IAAF from discharging its burden under the Rule.

B. Points of common ground amongst the parties' experts

366. It is helpful to begin the analysis of the scientific evidence by identifying certain matters which were common ground among the parties' experts. First, at the most basic level, the parties' experts agreed that:

- The same basic physics apply to amputee runners and able-bodied runners. Their physical performance and metabolism are governed by the same basic principles.

- The formula for running speed is (in words) as follows: running speed equals step frequency multiplied by step length, where step length equals contact length multiplied by stance average vertical ground reaction force relative to body weight.

- A person's running speed is, therefore, determined by a combination of contact length, contact time, step frequency and ground reaction forces.

367. Second, on a more sophisticated level, on the basis of the raw data generated by Dr Grabowski's study of Mr Leeper, it is common ground among the parties' experts that Mr Leeper's RSPs do not give Mr Leeper any advantage in respect of running economy and aerobic capacity. Accordingly, those metrics of athletic performance do not require further consideration by the Panel.

368. Third, it was also common ground between the parties' experts that Mr Leeper's RSPs cause him to start the 400m race slower than if he had intact biological legs. The Panel notes that the parties' experts were not in agreement regarding the precise magnitude of Mr Leeper's acceleration disadvantage, or the exact reasons for this disadvantage. Dr Grabowski calculated that the disadvantage would be of the order of 1.41 seconds. Dr Herr did not ascribe a specific time to the disadvantage, but stated that Dr Grabowski's report provided a reliable indication of the likely order of magnitude of the disadvantage. Dr Weyand estimated that the disadvantage was likely to be in the region of 0.5 to 0.6 seconds, and was the consequence of Mr Leeper running at an unnaturally tall height, rather than any inherent disadvantage caused by the use of RSPs *per se*.

369. The Panel does not consider it necessary – nor is it possible on the available evidence – to determine the exact degree of the acceleration disadvantage to the nearest tenth of a second. It is sufficient to observe that there is no dispute that Mr Leeper's RSPs cause him to accelerate more slowly than if he had biological legs, and that the scientific evidence suggests that the disadvantage is likely to be of the order of 0.5 to 1.41 seconds. Accordingly, the Panel's assessment of whether Mr Leeper's RSPs give him an overall competitive advantage must proceed on the basis that, in relation to the acceleration phase of the 400m race, Mr Leeper suffers a disadvantage of between about half and about one and a half seconds. The important

question is whether that disadvantage is offset, or alternatively magnified, by any other effects of his RSPs.

C. Does Mr Leeper experience a disadvantage in curve running in addition to his disadvantage in acceleration?

370. In respect of curve running, Dr Grabowski and her colleagues concluded that Mr Leeper experiences a disadvantage in the region of 0.4 seconds by virtue of his RSPs. The Panel considers that Dr Grabowski's study provides some support for that proposition. On the other hand, the Panel disagrees with Dr Grabowski that Mr Leeper's actual curve running performance during competitive races should be disregarded when seeking to determine whether his RSPs cause a disadvantage. In this regard, the IAAF's experts pointed out that in real-life race conditions Mr Leeper slowed on the second curve by a greater percentage than Dr Grabowski's calculations predicted but, importantly, by a *smaller* percentage than his able-bodied competitors slowed.

371. Accordingly, the Panel is faced with predictive evidence which suggests that Mr Leeper would slow by a greater percentage than able-bodied runners, and by evidence from a real-world competition which suggests that he slows by a smaller percentage than able-bodied runners. The evidence concerning the effect of Mr Leeper's RSPs on his curve-running performance therefore points in both directions. As set out above, in the case of any doubt, the doubt should be resolved in favour of Mr Leeper. Accordingly, the Panel proceeds on the basis that Mr Leeper experiences a disadvantage of up to (but no more than) 0.4 seconds in respect of curve-running compared with the curve-running performance he would be capable of achieving if he had intact biological legs.

D. Is Dr Grabowski's conclusion that Mr Leeper has an overall 1.81 second disadvantage in the 400m race as a result of his RSPs correct, or are there other factors that have not been considered?

372. The Panel notes that according to Dr Grabowski's analysis, Mr Leeper runs the 400m event in an overall time that is 1.81 seconds slower than he would be able to achieve if he had intact biological legs. It logically follows from that proposition that Mr Leeper's personal record if he had intact biological legs would be 1.81 seconds faster than the actual personal record of 44.38 seconds that he has achieved while using his RSPs. Accordingly, applying Dr Grabowski's analysis, Mr Leeper would be capable of running the 400m event in a time of 42.57 seconds if he was not a double amputee. In other words, Mr Leeper would be capable of running the 400m event in a time that is almost half a second faster than the current world record.

373. Further, the Panel notes that on Dr Grabowski's analysis, Mr Leeper would be capable of running the 100m sprint in a time that is 1.41 seconds faster than his actual personal record of 10.91 seconds. Accordingly, he would be capable of running the 100m in 9.50 seconds – almost a tenth of a second faster than the current world record. As the IAAF pointed out, this means that, on Dr Grabowski's analysis, if Mr Leeper had intact biological legs then he would be likely to hold the world records for both the 100m and 400m sprint events. The Panel regards this somewhat surprising proposition as a telling indication that there are other factors at play which either offset or at least mitigate the disadvantages described above.

374. The Panel agrees with the IAAF's experts that Dr Grabowski's analysis fails to engage meaningfully with the question of how, notwithstanding the serious disadvantage that she concludes that Mr Leeper experiences in respect of acceleration and curve running, he is nonetheless able to achieve overall 400m times that are quicker than 99.88% of all elite athletes. One theoretical possibility is that Mr Leeper would be the fastest sprinter in the history of athletics if he had intact biological legs. Another possibility is that there are other features or consequences of Mr Leeper's RSPs which enable him, partly or completely, to offset that disadvantage. Generally speaking, the more unusual a posited state of affairs or conclusion is, the less inherently likely it is to be the case. Without diminishing Mr Leeper's significant natural talent and commitment to training, the Panel does not consider it to be more likely than not that Mr Leeper would be the fastest sprinter in history but for his disability. This conclusion makes Dr Grabowski's analysis (which rests upon the proposition that Mr Leeper would be the fastest sprinter in history if he had biological legs) difficult to accept.

375. The experts engaged by the IAAF posit that Mr Leeper enjoys a significant performance advantage from his RSPs which more than counteracts any disadvantage in respect of acceleration and curve running. In particular, they contend that Mr Leeper's RSPs enable him to run at a height significantly greater than his natural height, and that this brings enormous advantages in terms of his overall 400m performance.

376. The possibility that Mr Leeper's RSPs enable him to run at a height that is much greater than the height he would be if he had intact legs, and that this enables him to achieve a much faster overall time in the 400m race than if he had intact legs, was not addressed in Dr Grabowski's study. Dr Grabowski took the decision to disregard height on the basis that Taboga 2020 Paper demonstrated that there was no relationship between speed and the height of one's prostheses.

377. The relationship between RSP height and running speed was the subject of considerable discussion and debate among the scientific experts during the hearing. In light of this evidence, the following two questions must therefore be addressed:

    1. First, do Mr Leeper's RSPs enable him to run *"unnaturally tall"*?

    2. Second, if they do, does this unnatural running height enable Mr Leeper to achieve times that are faster than he could achieve if he had intact biological legs?

1. Does Mr Leeper run unnaturally tall?

378. According to information provided by Mr Leeper prior to the hearing, his total height when using his RSPs is 189.2cm. It is not in dispute that, were Mr Leeper required to comply with the MASH rule, then he would not be permitted to run at a height above 174.4 cm. It follows that the height he runs at while using his RSPs is approximately 15cm taller than his MASH height.

379. During the course of the hearing, it emerged that some confusion may have arisen regarding the exact size of Mr Leeper's standing height as a result of different understandings of exactly

what standing height means. Even allowing for the correction of that confusion, however, it remains clear to the Panel that Mr Leeper runs at a height that is substantially greater than his MASH height and, more importantly from the Panel's perspective, greater than his height if he had intact biological legs, with a generous margin of appreciation for the diverse shapes and sizes of the human body.

380. The IAAF argues that this means that he is running *"unnaturally"* tall. Mr Leeper denies this. He submits that the MASH rule has no application outside the context of regulating para-athletics, and that since able-bodied athletes are not subject to any height limits, the notion that Mr Leeper could enjoy an unfair height advantage when competing against such athletes does not make sense.

381. The Panel accepts that the MASH rule does not govern eligibility to compete in IAAF-sanctioned events. Indeed, there are no rules that prevent athletes who are taller than a certain height or who have limbs that exceed certain proportions from competing in IAAF-sanctioned events. It does not follow from this, however, that the MASH rule is irrelevant to the question at hand. On the contrary, the Panel considers that the MASH rule provides an objective and reliable indication of Mr Leeper's likely maximum height if he had intact biological legs.

382. The MASH rule reflects the fact that among able-bodied individuals there is a general correlation between the length of an individual's lower limbs and the length of other parts of their body. That correlation is not exact, since there is a spectrum of bodily proportions across the general able-bodied population. Nevertheless, the correlation is sufficiently strong and established to enable scientists to calculate the maximum possible height a person could be based on the size/dimensions of certain parts of their body.

383. An able-bodied athlete cannot, of course, change the length or proportions of their legs. In contrast, an athlete with one or two missing biological limbs can determine the length and proportions of the prosthetic (*i.e.* artificial) limb which they use in place of the missing biological limb. Amputee athletes are therefore able to determine the height at which they compete in a way that non-amputee athletes are not. The MASH rule is intended to prevent a disabled athlete from using a prosthetic limb that is longer than enables them to compete at a total height which is greater than the maximum possible height they would have been if they had fully intact biological limbs. This is grounded on similar considerations of fairness as underpin the Rule here (*viz.* the need to ensure that disabled athletes do not use prosthetic aids that over-compensate for the absence of a missing limb).

384. While it is correct that the MASH rule has no direct application to able-bodied athletes, this does not mean that it is irrelevant to the question of whether Mr Leeper derives an overall competitive advantage through the use of his RSPs. While able-bodied athletes are not required to conform to the MASH rule, this simply reflects the fact that the MASH rule assumes (on the basis of scientific evidence) that all able-bodied athletes have lower limbs that are proportionate to the length of the rest of their body, within a generous allowance. In other words, if the torsos and upper limbs of all able-bodied athletes were measured and those measurements were used to calculate those athletes' notional "MASH" heights using the established MASH formula,

none of those able-bodied athletes would be taller, or significantly taller, than their notional "MASH" heights.

385. It follows from this that, since Mr Leeper's RSPs enable him to run at a height which is significantly taller than his MASH, Mr Leeper is indeed running unnaturally tall. In short, he is running at a height which is significantly greater than the height that he would run at if he had intact biological legs.

2. Does the height of Mr Leeper's RSPs give him any performance advantage?

386. Having determined that Mr Leeper's RSPs do enable him to run at a height which is significantly taller than his maximum height if he had intact biological legs, the next question is whether running "taller" in this way also entails running faster in the 400m event.

387. Dr Grabowski and Dr Herr contend that there is no support for the suggestion that running taller enables Mr Leeper to run the 400m faster than would otherwise be the case. In support of the proposition that the height of an athlete's RSPs does not determine their 400m time, Mr Leeper relied on the Taboga 2020 Paper. However, there are several reasons why, in the Panel's view, that paper does not provide reliable support for the proposition advanced by Mr Leeper:

- First, the Taboga 2020 Paper was based on data from a sample size of just five athletes. It is inherently difficult to draw statistically meaningful conclusions from a sample population as small as this.

- Second, the study did not find any statistically significant relationship between the length of athletes' RSPs and those athletes' running speeds. The p value was 0.76. The Panel accepts the evidence of the IAAF's experts that the only proper conclusion that can be drawn from this p value is that there is insufficient evidence regarding the null hypothesis (*viz.*, that prosthetic height has no effect on maximum speed). In other words, the p value neither proves nor disproves the hypothesis that longer RSPs cause increased speed. The p value reflects an absence of evidence; it is not evidence of absence.

- Third, the participants in the study underwent a significant number of maximal speed tests in a period of just 10 – 11 days. Dr Weyand explained, however, that when testing elite athletes, it is standard practice to allow at least two days of rest between maximal speed tests in order to enable proper recovery. In the Panel's view, the reliability of the data generated by the Taboga study is therefore open to question.

- Fourth, there were other potentially important confounding factors at play in the Taboga study. In particular, the study involved changing not just the height of RSPs (which is likely to require a degree of familiarisation before any comparative conclusions can be drawn) but also changing the model and stiffness of the RSPs. In order to draw reliable conclusions about the effect of RSP height on running speed, it would be necessary to reliably exclude any possible confounding effects which arise from the use of variable models and stiffnesses.

- Fifth, the Panel notes that certain of the results in the Taboga 2020 Paper are in fact consistent with the proposition that increases in prosthetic height causes increases in running speed. On any view, the results recorded in the paper do not all point in one direction. Indeed, as the UQ Experts pointed out, if one focuses exclusively on the maximum speed attained by each of the five subjects while using their usual model of RSPs at the usual stiffness, then of the three heights investigated (baseline, +2cm, +4cm) all but one of the five subjects achieved their maximum velocity at either +2cm or +4cm. This suggests that increasing prosthetic height (even by small margins) may cause an increase in maximum speed.

- Sixth, the Panel notes that several journals declined to publish the Taboga 2020 Paper before it was finally accepted for publication by PLOS One. When questioned about the reasons for this, Dr Grabowski's response was unconvincing. The Panel further notes, in this regard, that following the publication of the Taboga Paper a number of scientists (including several who had previously collaborated with Dr Grabowski) wrote to the PLOS One journal requesting that the paper be retracted due to what the authors of the letter regarded as fundamental flaws in the paper's methodology and analysis. This unusual request for the retraction of a paper reinforces the Panel's concerns regarding the reliability of the conclusions set out in that paper.

388. In light of the points identified above, the Panel concludes that the Taboga 2020 Paper does not provide any reliable support for the proposition that increases in RSP height have no effect on running speed. At the same time, the Panel notes that there is in fact cogent evidence which supports the contrary proposition (namely that increases in RSP height do cause increases in running speed). In particular, Dr Weyand and Dr Bundle provided a detailed explanation of the scientific evidence which establishes that, all other things being equal, increased leg length causes increased running speed. This is because there is a close correlation between an athlete's leg length and their ground contact length (*i.e.* the distance that a runner's body travels while their foot is in contact with the ground). Increasing the size of a prosthetic limb beyond normal anatomical proportions therefore increases ground contact length. Since contact length is a direct determinant of running speed, an increase in limb length entails an increase in running speed.

389. Having carefully considered all the evidence, the Panel concludes that the IAAF's experts are correct when they state that there is a direct relationship between leg length and running speed. In addition to the evidence cited by the IAAF's experts, the Panel agrees with Dr Tweedy's observation that it is inherently implausible that prosthetic length would have no effect on running speed. As Dr Tweedy explained, the proposition that there is no relationship at all between prosthetic length and running speed is an implausible one: it would mean that Mr Leeper's 400m times using the shortest prosthetic that enables functional running or his 400m performance using the tallest prosthetic that enables him to *"wobble round a track on"* would be exactly the same as his 400m times using his current RSPs. Common-sense suggests this is unlikely to be correct.

390. In their expert report, Dr Weyand and Dr Bundle explained how, if the height of Mr Leeper's RSPs was reduced by 15cm so that Mr Leeper ran at his MASH height, then his top speed would be likely to reduce from 11.4 m/s to 9.8 m/s, and his overall 400m time would be likely to increase by approximately eight seconds. As noted above, it emerged during the hearing that there may be some minor confusion regarding Mr Leeper's exact standing height (which had arisen due to different understandings of exactly what is meant by that expression). In cross-examination, Dr Weyand explained that, even allowing for that confusion, there was no doubt in his mind that Mr Leeper was running at an *"anatomically disproportionate"* height which was *"well outside"* his MASH height and that as a direct result of this he is able to achieve 400m times which are several seconds faster than he could achieve if he had intact biological legs (even allowing for the disadvantage he experiences in the acceleration phase of the event and any potential disadvantage in respect of curve running). Having carefully considered the evidence, the Panel accepts the correctness of Dr Weyand's conclusions. The Panel therefore concludes that, by virtue of the fact that he uses RSPs that enable him to run at a height that is several inches taller than his maximum possible height if he had intact biological legs, Mr Leeper is able to run the 400m event in a time that is several seconds faster than the fastest time he would have been able to achieve with intact biological legs.

E. Conclusion

391. For the reasons set out above, the Panel concludes that the IAAF has established on a balance of probabilities that the particular RSPs used by Mr Blake Leeper give him an overall competitive advantage in the 400m event over an athlete not using such a mechanical aid and that, accordingly, Mr Leeper may not use his particular RSPs in the 400m event in the Olympic Games or World Athletics Series competitions.

ON THESE GROUNDS

The Court of Arbitration for Sport rules that:

1. The appeal filed by Mr Blake Leeper against the International Association of Athletics Federations with the Court of Arbitration for Sport on 27 February 2020 is partially upheld.

2. Rule 6.3.4 of the World Athletics Technical Rules is unlawful and invalid insofar as it places the burden of proof upon an athlete desiring to use a mechanical aid to establish that the use of the

mechanical aid will not provide the athlete with an overall competitive advantage over an athlete not using such an aid.

3. The International Association of Athletics Federations has established on a balance of probabilities that the particular running specific prostheses used by Mr Blake Leeper give him an overall competitive advantage over an athlete not using such a mechanical aid. Accordingly, Blake Leeper may not use his particular running specific prostheses in the Olympic Games or World Athletics Series competitions.

4. (…).

5. (…).

6. All other motions or prayers for relief are dismissed.