For World Gymnastics - A cautionary look at the Fujitsu Judging Support System

Hardy Fink – November 22, 2026

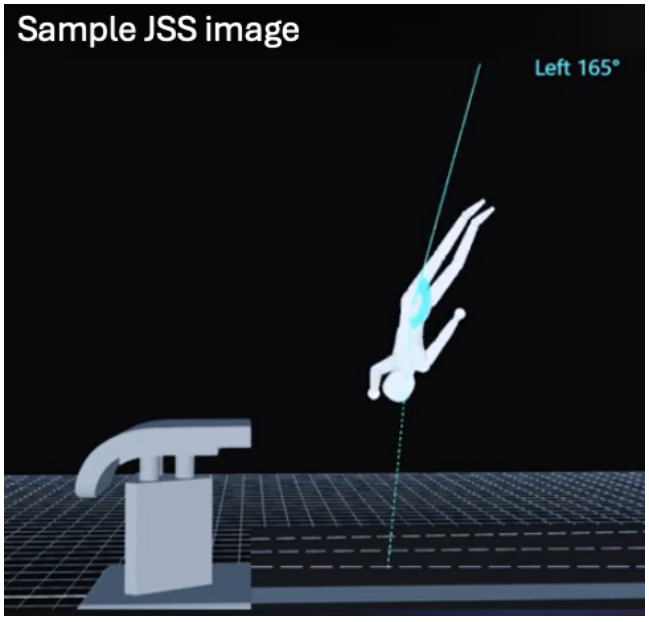
Overview:

I argue in this article that JSS, which is expected to increase fairness, transparency and consistency, is far from meeting any of those goals.

1. *JSS is not and can never be 100% accurate, especially for complex three-dimensional movements.*
2. *JSS has measurement errors that it must always disclose.*
3. *JSS must be used to assist judges when consulted, but not necessarily be decisive.*
4. *JSS must be used primarily to provide fairness and protect gymnasts from measurement uncertainty.*
5. *JSS views not visible to judges are not fair to gymnasts and should not be used to penalize them.*
6. *JSS is very far from replacing judges and, even if it becomes good enough, this should never happen.*
7. *JSS is impossible to oversee, it is evolving and vulnerable, yet we are expected to trust it.*
8. *JSS leads to uncomfortable questions about its effect on rules, training and competition decisions.*

It is a long article. *If you wish, you could jump to the end where I list recommendations for World Gymnastics to consider: to protect gymnasts from JSS negatives and to take expert oversight of its development and implementation. We must ensure that its long-term improvement is in alignment with WG goals and values.*

Since 2017, FIG (now World Gymnastics) has collaborated with Fujitsu to develop a system to help judges increase *"fairness, transparency and consistency"*. The system dubbed JSS (Judging Support System) has been partially available and implemented since the 2019 World Championships. At the 2026 World Championships in Rotterdam, it was fully implemented for supervisors (and D-juries on most apparatus) to assist in confirming or denying the difficulty of an element based on the display of angular deviations. To do that, JSS uses multiple cameras to generate a silhouette of the gymnast (white on black background) on which points depicting approximate joint locations and lines depicting positions and angles could be superimposed but the contours and detail of the gymnasts disappeared.



At the same time, it also generated the difficulty value and symbols for the entire routine with about 80% accuracy. Although impressive, that capability is far from ready and was not used.

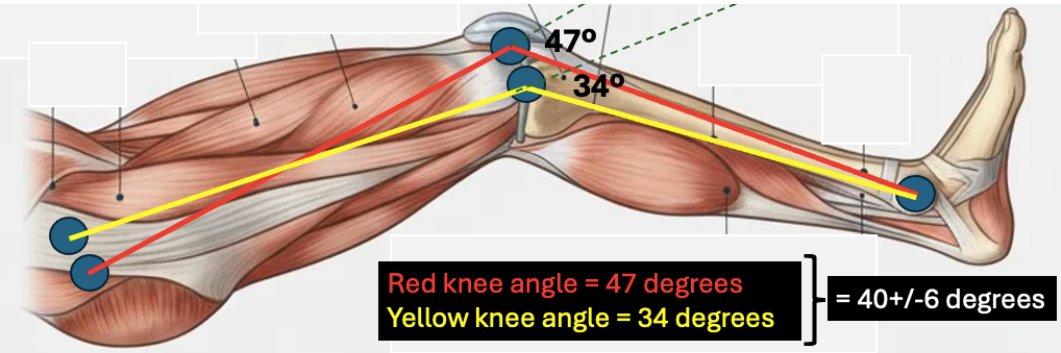
JSS was used in Rotterdam multiple times to help judges confirm angles and thus the difficulty of a skill very much as was done for about 25 years with the IRCOS videos. But this Fujitsu JSS software has been deemed to be more accurate and thus often used as decisive rather than informative. Therein lies an enormous problem. JSS is not and cannot be precise in any dynamic cases, nor accepted as being accurate, to within five degrees much less one or two degrees. Note the difference, an IRCOS video-review (a second look) allowed judges to review what they had seen. A JSS-review provides additional views and information that judges could not see. That is an enormous difference.

Much of the gymnastics world considers some controversial Rotterdam decisions to have been wrongly decided. Not that JSS was necessarily wrong, but the judges' reliance on it led to decisions that are questionable.

There are errors in JSS measurements

The job of judges is to make a judgement. Occasionally, a review is necessary. But JSS's determination of 46-degrees has no greater validity than an experienced judge's 44-degrees. JSS is there to assist, not to decide; the judge is there to make a judgement because of or despite the assistance. **Before I can accept the JSS measure of the possible error of the gymnast, I expect first to see revealed the degree of possible error in the JSS measurement.** When a judge says 44-degrees, it is understood to be an estimate. When JSS says 46-degrees, it is accepted as precision. That is a problem.

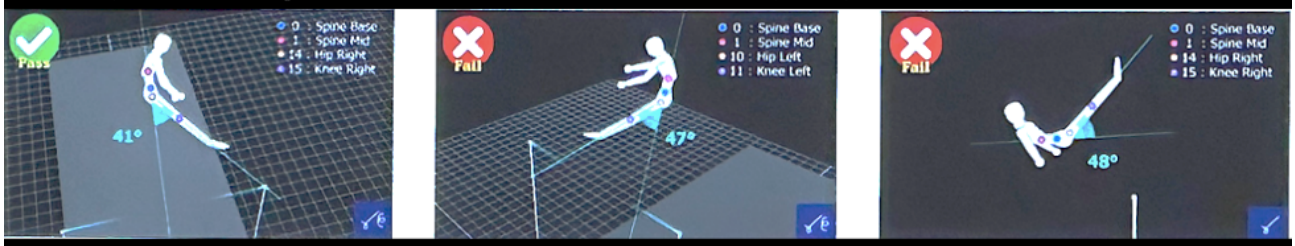
Every serious measurement is displayed with a +/- tolerance (just look at the apparatus specifications). What is the +/- tolerance of JSS measurements? When it measures from the shoulder joint to the wrist, or the hip to the ankle, or the angle at the knee, it is absolutely not 100% accurate.



Small changes in the estimate of joint locations can yield big differences in measured angles. The most honest measure for this example is 40+/-6 degrees. Our eyes agree, not quite a tuck.

When it measures one line from middle-to-lower-spine it is estimating a curved posture with dubious endpoints into a straight line from which other angles are measured, also with estimated joint locations. How to identify joints and draw lines was no doubt agreed with WG experts. Perhaps, it is the best that can be done given the complexity of gymnastics movements. But all knew, or should have known, that they necessarily built in measurement uncertainty yet chose to "sell" the outputs as exact. They chose not to reveal inescapable measurement errors because "exactness" is what was wanted. This must be acknowledged and fixed.

Issues with both validity and reliability of measurements. No range of error shown.
Validity = measuring what it claims to measure. Reliability = replicability of identical measure.



From MTC Roundtable – October 23, 2026, Rotterdam - note the mid-spine to spine base "straight" reference line and the poorly estimated location of the hip joint. The claimed precision is a fiction.

I urge you to try this from a standing position: *move your arm/shoulder down (depression) and then up (elevation) or forward (protraction) and then backward (retraction). You have changed the location of the shoulder joint by perhaps as much as 20cm each time. The arm can be moved and rotated in many other ways as well, each time affecting the location of the shoulder joint. The trunk complex with the shoulder can also be rotated some 180 degrees at the hip and continuously over its length; the shoulder/trunk can be curled forward or arched backward and even curled inward or outward. This is less so at other joints, but can JSS be accurate to 1cm or even 2cm for the location of the other joints in a dynamic and moving body that has multiple degrees of freedom at every joint? For example, the large amount of hip/trunk rotation that is often necessary complicates the determination of the location of the centre of the joint?* ***Try also this:*** *from a standing position, bend slightly at the hip, now tilt the shoulder downward and inward and rotate the trunk as in a twisting salto. Suddenly the hip angle, though small, looks larger and the accurate determination of a hip angle becomes a guess complicated also by the foreshortening of some joints or limbs.*

It is impossible for JSS to give an exact angle. It is wrong for judges to accept these angles as more than the "programmed" estimates that they are.

A 46-degree measurement or any "exact" measurement of dynamic three-dimensional movement by JSS is a fiction. The real measure might be off by +/-2 degrees or, in some cases as much as or more than +/- 5 degrees. In other words, the 46-degrees should be shown to the judges as, for example, 46+/-2 degrees. What is shown to the judges by JSS as a precise measure is a lie if the degree of possible measurement error is not revealed. With such more complete information, the judges are enabled to make a judgement, rather than accept an incompletely revealed determination by JSS. In every case, in the interests of *increased fairness*, the benefit of that doubt must always go to the gymnast. With the current use of JSS, this was not always the case. World Gymnastics (WG) must assure it is done.

In a detailed study of a simple split leap on beam *in a controlled laboratory setting (Ishikawa et al, 2026), JSS's system was assessed as* ***"broadly similar"*** *to the gold-standard VICON system with an average error of -1.1 degrees but with individual differences approaching 10 degrees.* ***On a split leap!*** *Nevertheless, the researchers concluded "The results of this study suggest the* ***potential application*** *of the JSS..." and "…future research should evaluate the system across a wider range of high-difficulty elements…"*

Complex three-dimensional skills are immensely more challenging and less amenable to precise measurement of skeletal coordinates than a split leap. The estimated error range must be disclosed.

It is not necessarily the case that many decisions made by reliance on JSS measurements were wrongly decided, but with certainty some were. And each one is a new kind of tragedy and scandal for our sport, especially so when it affects a potential medal and when it deviates so suddenly and dramatically from any previous human evaluation of the performance of that skill. Fujitsu claims it uses proprietary correction algorithms for its error estimation and posture recognition software. What about *increased transparency*? It also claims to have dealt with and "solved" earlier issues related to differences in physique, morphology, height, skin colour, clothing, lighting, soft-tissue movement, low resolution images, etc. Each time with a non-public programming tweak.

A further observation: It appears that in some cases JSS was selectively consulted to deny, or attempt to deny, D-value for some gymnasts. Every new tool and every new system has the potential to be abused, particularly by the unscrupulous. JSS is no different. World Gymnastics must absolutely put in place guidelines that such abuse can never happen. Failing to do that will not fulfill the promise of *"increased fairness, transparency, and consistency".*

No judge could see that

In some, perhaps in all cases, the video view from multiple cameras, differed from anything the judges could ever see. Is that a fair way to assess gymnasts when they will never have access in training or in lesser competitions to such technology and to train for these unknowable views? **No!** Should a view from the judges' position be supplemented by other views or by magical 3D-rotation of their view to help penalize gymnasts? **No!** Did anyone ask for this? **No!** Is this greater precision? **No!** Should it detect and report what the human eye will miss or cannot possibly see? **No!** None of this *increases fairness* for gymnasts.

That said, the accomplishment of this software is astonishing. I am fully in support of developing its capabilities. But it must only be used to serve the gymnasts, not for WG to bask in the glow of a new technological super-tool as I sense some are prematurely doing. As a warning, Fujitsu admits in its own words; *"…as the scope of robot applications expands and collaboration with other equipment increases, risks such as cyberattacks, system-wide downtime or malfunctions, and leaks of confidential information also rise."* This is more than troubling!

No one asked for this

As I frequently say when my car and appliances make comments or signals: "Nobody asked for this." We must be careful what we ask for. We must be careful of perverse incentives. We must be careful of misaligned incentives. Who evaluates JSS and controls its use? Fujitsu is already recommending rule changes to make itself and JSS measurements more indispensable, not to make gymnastics better. How much should a partner's technology influence rules and training and competition decisions? How dependent will we permit ourselves to become on an evolving, autonomous and vulnerable tool over which we have no control, into which we can have no insight and that we are forced to trust? Is it even possible to exert effective oversight?

There are some, including WG president Mori Watanabe, that envision a future where judges are superfluous, where cameras and software programs will determine first the D-score, and eventually also the E-score. Appalling or appealing? Utopia or dystopia? **Watanabe in Rotterdam**; *"Our dream is to have no judges, only computers and AI awarding scores. We must be fair to everybody. I don't want mistakes or misjudgments."* We are a long way from this. We must start by first acknowledging JSS mistakes and work to minimize them.

What if WG decides on no judges?

It is certainly possible that such a decision could be made, and the gymnastics community will be forced to live with the AI flaws much as we live with human flaws today. But that will be a sad day for gymnastics and possibly the end of it. How much are we willing to surrender? No judges mean no costs, no courses, no hassles, no meetings. Only costs for programmers, technicians (13 in Rotterdam), hardware, set-up, etc. The programmers will determine the winners. Fujitsu again, "…*risks such as cyberattacks, system-wide downtime or malfunctions, and leaks of confidential information*…". Hackers and/or AI failures have caused world-wide havoc in recent weeks (and for years before). JSS will not be immune.

There are tens of thousands of competitions and millions of training settings that will never have access to this technology. Phone-App approximations that will mine even more of our data are sure to come – indeed, are already being planned. This technology may require top gymnasts to adjust training and engineer routines for an algorithm. We will still require a truncated pyramid of judges whose aspirations and motivations and education and experience will be limited in advance. Sad for those of us who truly love judging.

Some things should be preserved for human beings even if, eventually, JSS does it as well or better. I, for one, am not ready to embrace a post-human world and the diminution of human agency. Gymnastics is a human sport that should be evaluated by humans who could occasionally choose to consult AI, video, and

other tools – but to evaluate that input wisely. Let's contribute to make those tools the very best they can be so they can **assist and enhance human expertise** when consulted. And where are we on the promises? A long way to go on *increased Fairness* which will depend on WG decisions; near zero on *increased Transparency*; *increased Consistency* will depend on how often and how the programming is tweaked. We have real influence only regarding *Fairness*. World Gymnastics must evaluate what went well and what went amiss with the implementation of JSS in Rotterdam, because the things that seemed to have gone amiss did not serve gymnasts nor the gymnastics community well.

Next steps for World Gymnastics to consider

*The World Gymnastics leadership must firstly, **protect gymnasts** from any potential JSS negatives and secondly, make efforts to both control and improve JSS.*

***Gymnast protection from JSS uncertainty**:*

1. *Consulting JSS must be done only under strict guidelines and can never be initiated in an arbitrary or targeted manner.*
2. *Each JSS measure must clearly indicate the range of measurement error (+/-) otherwise it cannot be used in any scoring decisions.*
3. *Except under extraordinary circumstances (to be defined), JSS views and data not visible to the judges cannot be used in any scoring decisions.*
4. *Any doubt, or any error range that includes "no fault", must be decided in the favour of the gymnast.*
5. *JSS generated measurements that alter a judge-determined D-score must be disclosed and be immediately available for the gymnast and coach.*
6. *There can be no JSS programming changes or JSS influenced decisions within six months in advance of a World Championships.*

JSS oversight and enhancement

1. *Establish an expert panel to monitor, control, advise and direct JSS outputs (with +/- errors) to ensure it aligns with WG policies and values.*
2. *Contribute and collaborate to make JSS as excellent as possible and to continuously improve it to, when consulted, assist and enhance human expertise.*
3. *Ensure data security and establish emergency protocols for all potential catastrophic failures.*