Field Based Sub-Maximal & Conditioning Insights
Applications to Individual Specifics

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Field Based Sub-Maximal & Conditioning Insights Applications to Individual Specifics
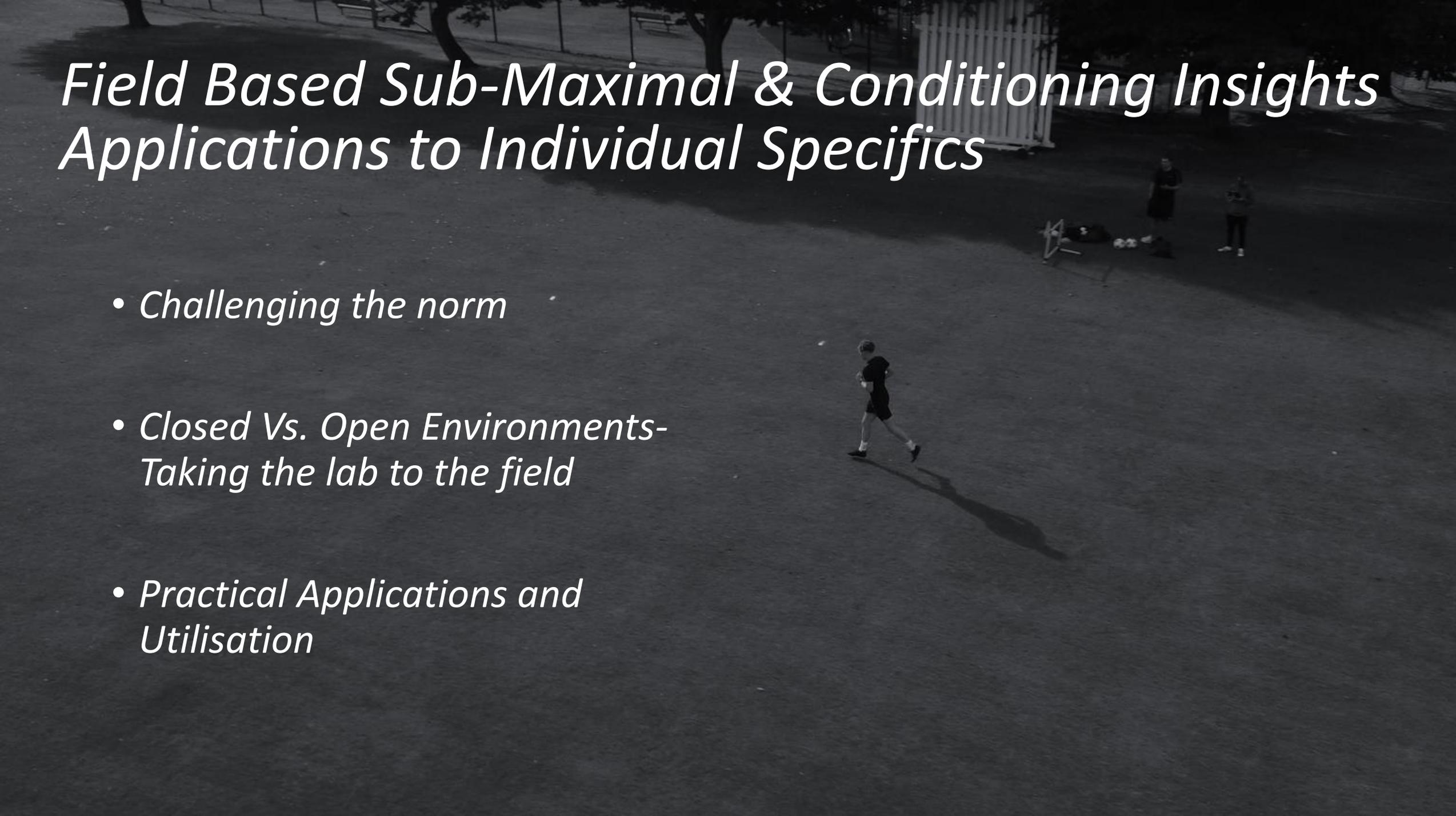
- *Challenging the norm*

- *Closed Vs. Open Environments- Taking the lab to the field*

- *Practical Applications and Utilisation*

Rewind and think....

- *2004 working as a practitioner...*

- *Heart Rate & RPE the 'Load' monitoring tools we rely upon (Internal)*

- *Gym 'loads' & tracking progress where limited.*
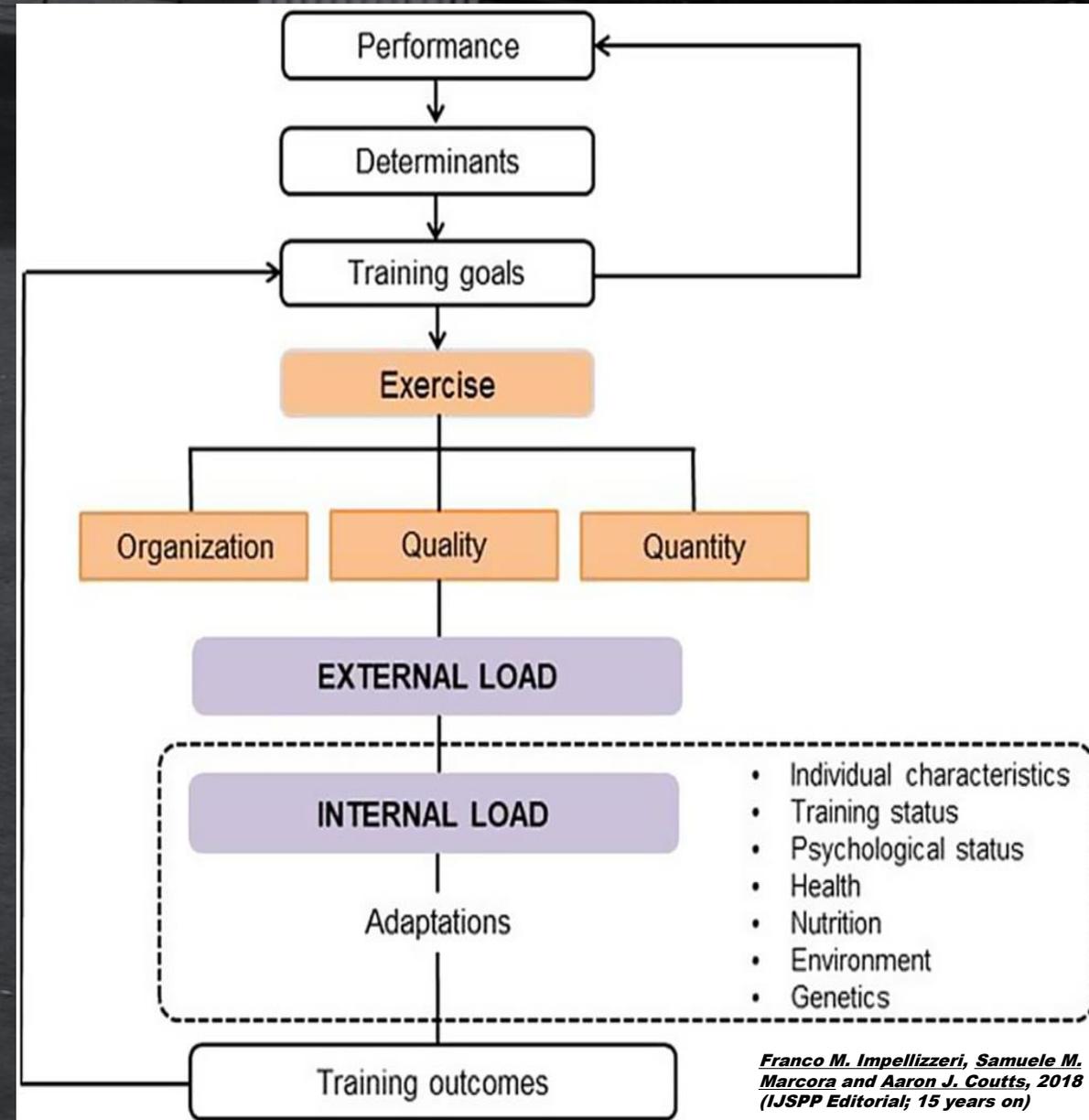
Franco M. Impellizzeri, Samuele M. Marcora and Aaron J. Coutts, 2018 (IJSPP Editorial; 15 years on)

How do we challenge the norm???

Establish well planned, quality
PERFORMANCE QUESTIONS

anco M. Impellizzeri, Samuele M.
arcora and Aaron J. Coutts, 2018
SPP Editorial; 15 years on)

Answering Performance Questions with Tech …

Robertson, S et al., (2024) Development of a sports technology quality framework

Sports Technology Quality Framework

PILLARS

Pillar A	Pillar B	Pillar C	Pillar D	Pillar E
Quality Assurance & Measurement	Established Benefit	Ethics & Security	User Experience	Data Management

FEATURES

Accuracy	Construct Validity	Compliance	Usability	Data Standardisation
Repeatability	Concurrent Validity	Privacy	Robustness	Interoperability
Reproducibility	Predictive Validity	Ownership	Data Representation	Maintainability
Specifications	Functionality	Safety	Customer Support & Training	Scalability
		Transparency	Accessibility	
		Environmental Sustainability		

Figure 2. The sports technology quality framework.

Modern Day influence of tech…

Robertson, S et al., (2024) Development of a sports technology quality framework
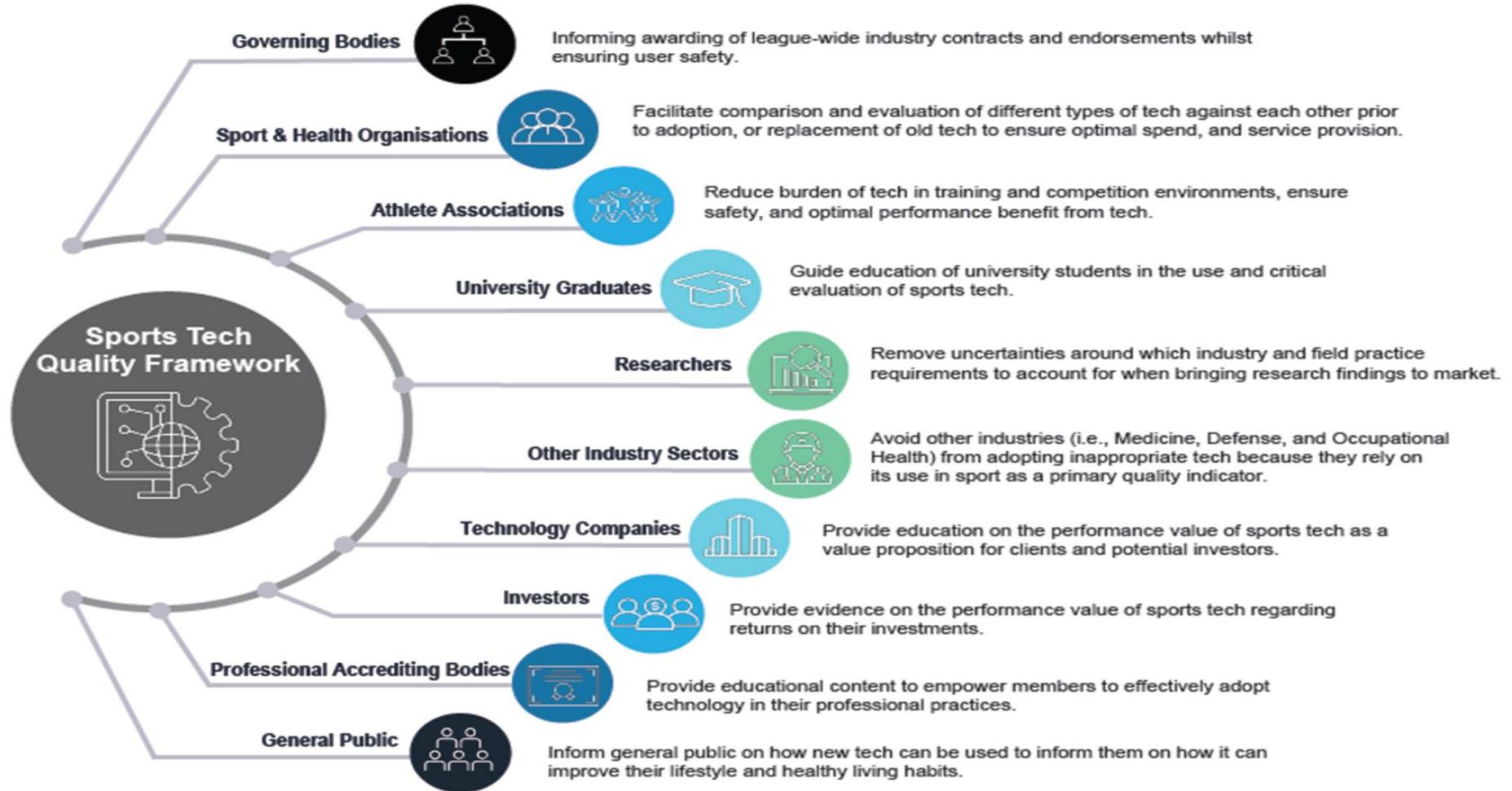
Figure 1. Current challenges for sport technology stakeholders.

The art challenges
the technology &
the technology
inspires the art....

Are we leading with innovation or following others?
(Lab to the field theory coming up!)
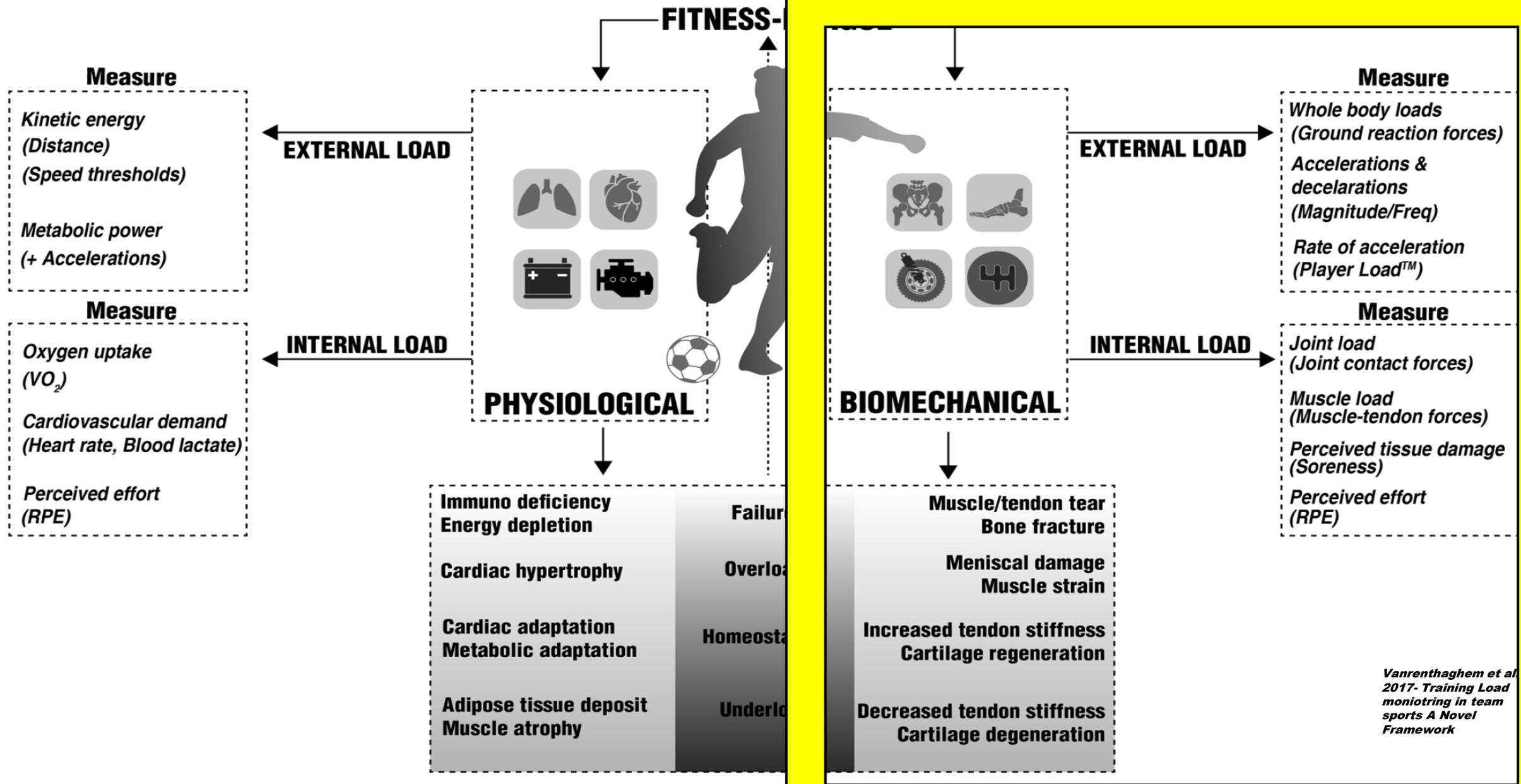
Fig. 1 A new player load monitoring framework outlining the cyclical nat... ...e...... ...p..y...g... ...p...... of the biological system as a whole. *RPE* rating of perceived exertion, *Freq* frequency
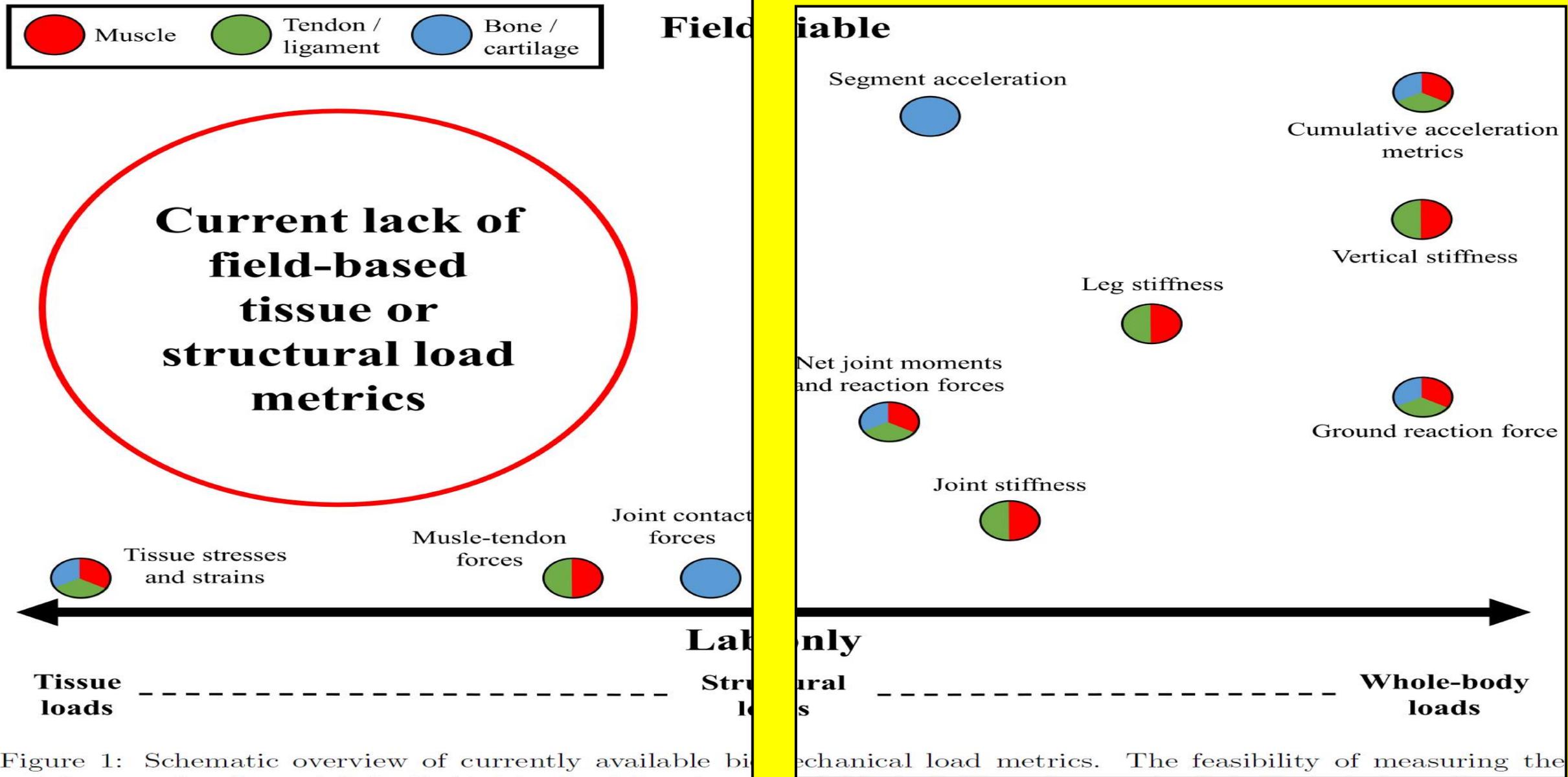
Figure 1: Schematic overview of currently available biomechanical load metrics. The feasibility of measuring the metrics, ranging from strictly limited to the laboratory [...] The level at which loads act on the musculoskeletal syst[...] tissues affected by each load metric are shown in red (muscles), green (tendons and ligaments) and/or blue (bones and cartilage). Metrics to assess tissue- or structure-specific loads that are viable to be measured in the field are still lacking.

Measuring Mechanical 'Loads'…

How do we translate the lab to the field to get where we want?

Barrett et al., 2014- Playerload: Reliab[...] during treadmill running

Barrett et al., 2015- Within match Playerload patterns during a simulated soccer match

Getting insights from the source of motion…

- *Muscle dampening effect on upper body mounted devices (COM Vs. SCAP)*

- *Missing key on-field Mechnical 'Load' insights into screening/RTP*

- *Can we get answer multiple performance questions with one process?*

Development of gait metrics

Amit & Barrett 2020- Development of gait based measures for foot-mounted IMU Devices (Internal project vs. a criterion measure)

The TAU experiment

- 11 participant
- Speeds range is 4-22 km/h in increments of 2 km/h. Each participant ran for 30 s in each speed. (Not all participants achieved max speed)
- Total of ~8000 steps recorded
- For each step, the treadmill measured the full ground reaction force profile. In this project we used only the contact duration.
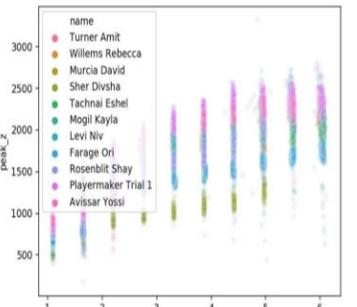
A

B

Myhill et al., 2023- Concurrent validity and between unit reliability of a foot-mounted inertial measurement unit to measure velocity during team sport activity
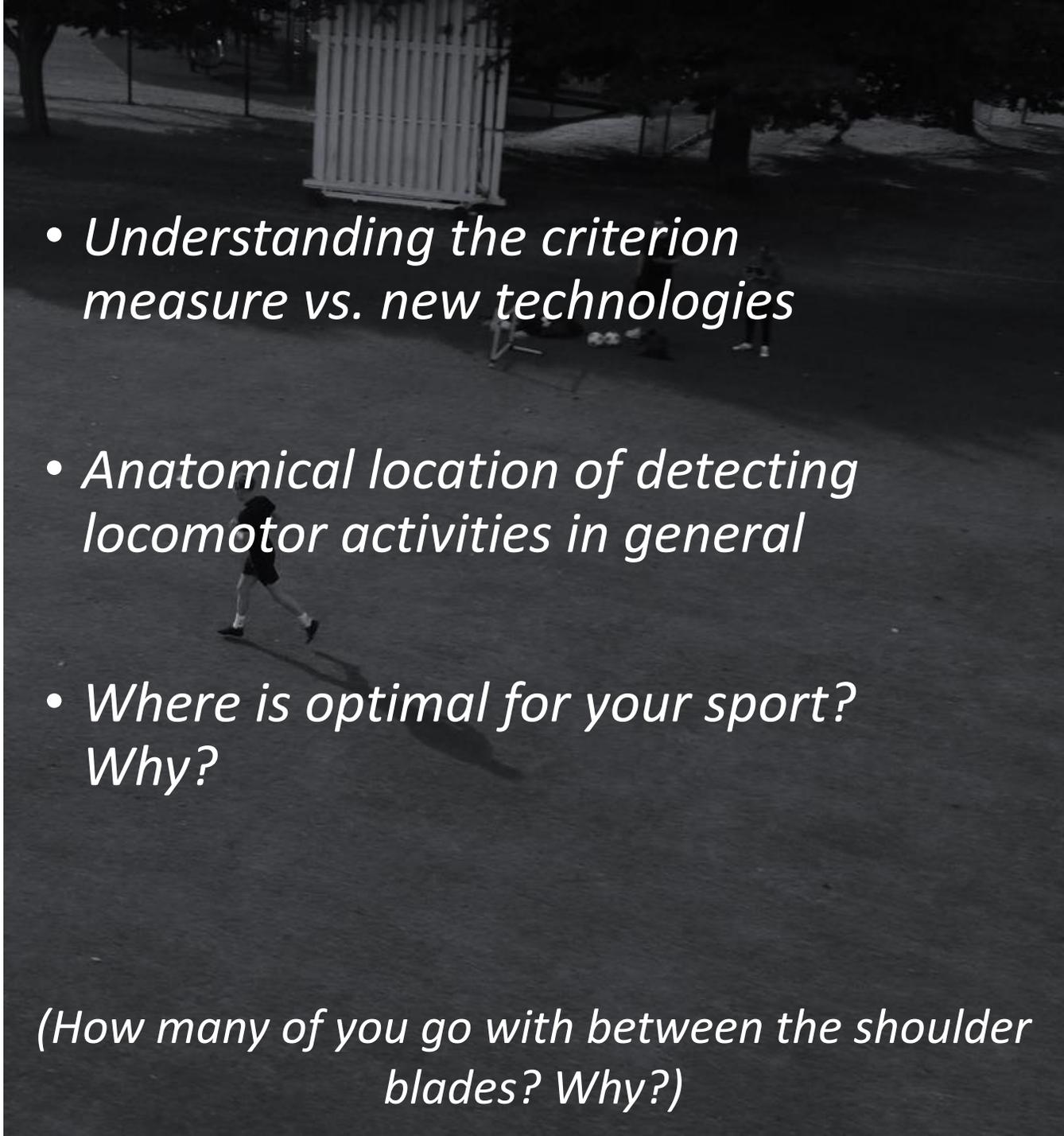
- *Understanding the criterion measure vs. new technologies*

- *Anatomical location of detecting locomotor activities in general*

- *Where is optimal for your sport? Why?*

(How many of you go with between the shoulder blades? Why?)

Back to the Field!

Hallelujah!

Proposed Title: A Methodological Comparison of Protocols and Analytical Techniques to Assess Submaximal Fitness Tests Outcome Measures

Practical Applications

This study provides practical insights into the collection methods and analytical processes of SMFT outcome measures as adopted in both research and practice. Specifically, practitioners should be aware of the expected outcome measure variability, and how these may differ according to the SMFT protocol and analytical techniques. The results demonstrate that HRex has high levels of reliability, reinforcing its use as the main HR derived measure within SMFT

HRR reliability outcomes, practitioners are advised to use the last 5–10 s of the recovery and analyse HRR as the mean or minimum HR value observed during this period. Whilst the reliability of PL$_V$ (MEMS between scapulae) and CT (foot-mounted) was comparable across testing protcols and analysis techniques, practitioners are reminded that future studies are necessary to examine the validity and sensitivity of these measures for monitoring neuromuscular training effects.

Auditory cue ⟶   0m

Running speed: ~11 km·h⁻¹	Running speed: ~12.8 km·h⁻¹	Running speed: ~18 km·h⁻¹
Duration: 3:00 min	Duration: 3:02 min	Duration: 4×10s / 20s recovery
Distance: 550m	Distance: ~650m	Distance: 200m
N shuttles: 11×50m	N shuttles: ~13×50m	N shuttles: 4×50m

Time (s): 0   60   120   180   240   300   360   420   480   540   600
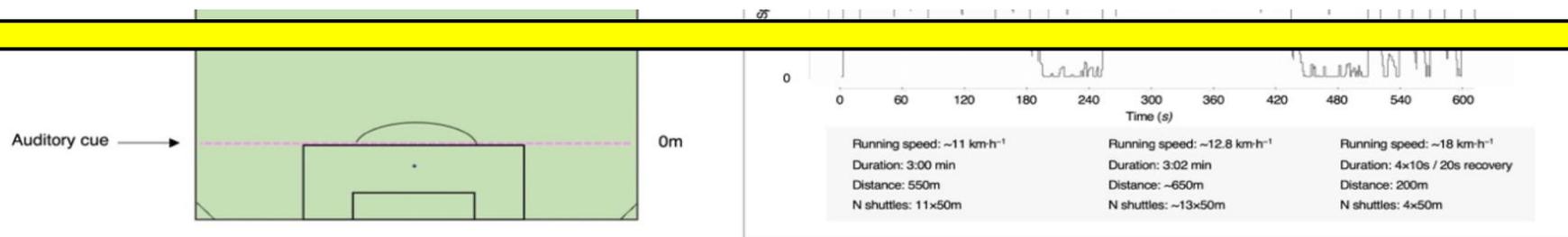
Monitoring Status – Warm-Up?

**Contact Time
Left= 220 ms
Right= 221 ms**

4min Sub-Max Run @ 12km/h

Continuous running, with poles 50m apart (15s between each pole)

Is it possible to implement this in your environment?
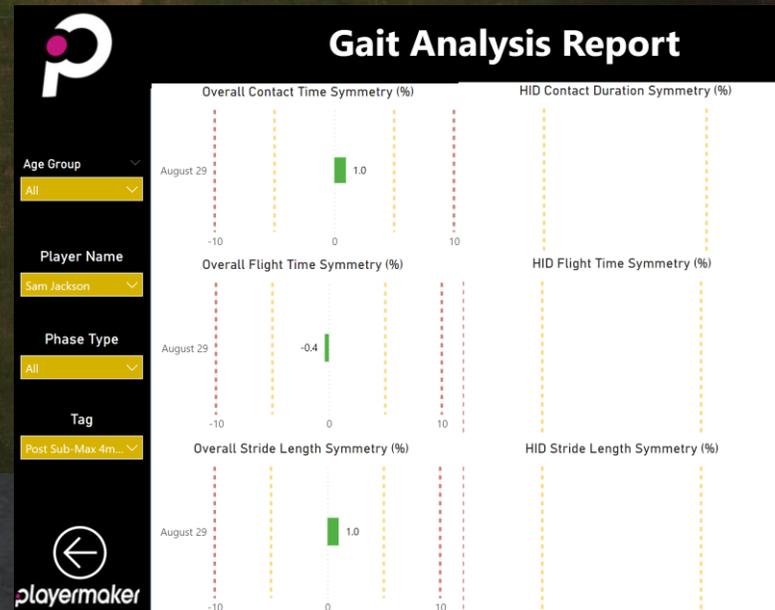
Monitoring Status- Speed Exposure?

Contact Time
(>7m/s)
Left= 110 ms
Right= 112 ms

Sprints @ the end of
a Warm-Up

Player performs 2-3
>95% max sprints as
part of their speed
exposure.

Is it possible to
implement this in
your environment?
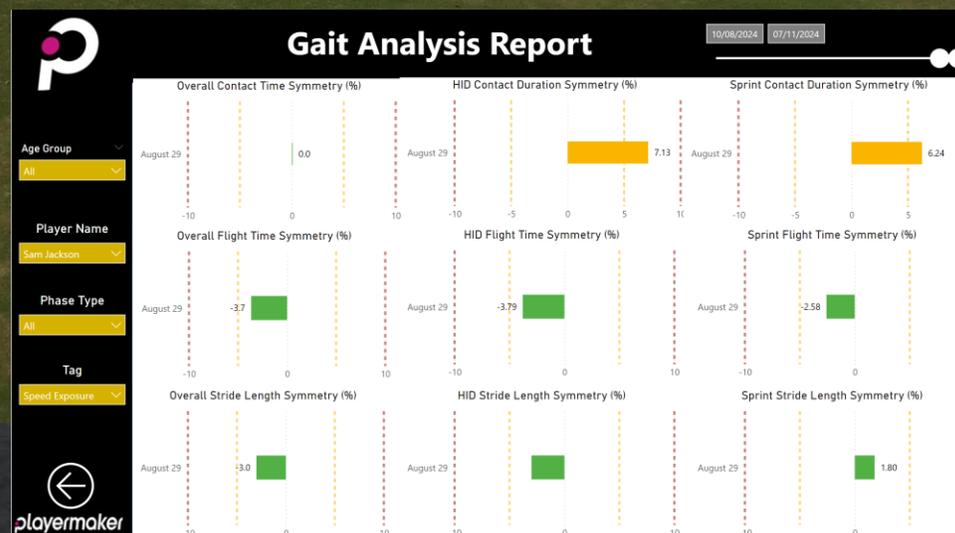
Monitoring Status- Position Specific HIIT?

15s:15s of 2 sets of 8-12 reps.

Soccer/Football full back, closes the opponent down, followed by tracking back. Red cones, 90% stride.

Is it possible to implement this in your environment?
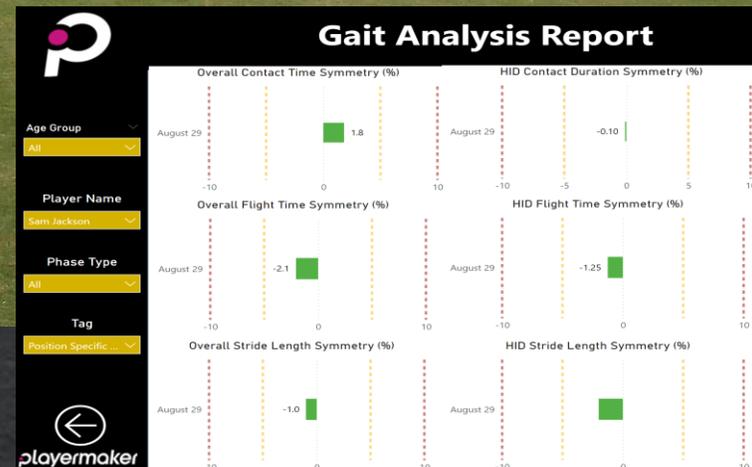
Contact Time (>5.5m/s)
Left= 117 ms
Right= 117 ms

Playermaker

Example Contact Times from different drills
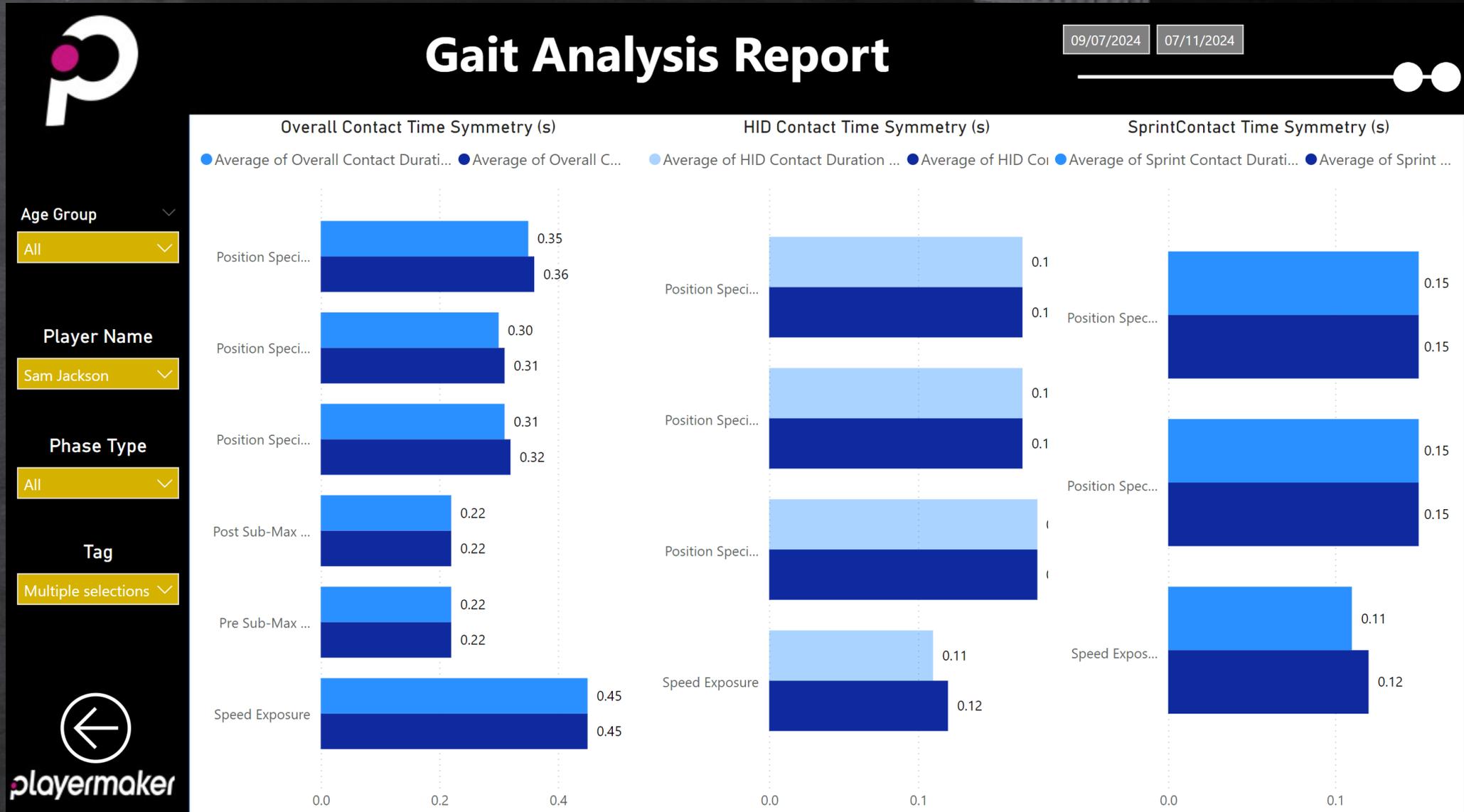
Future Open Environment Variability

Per Effort Analysis
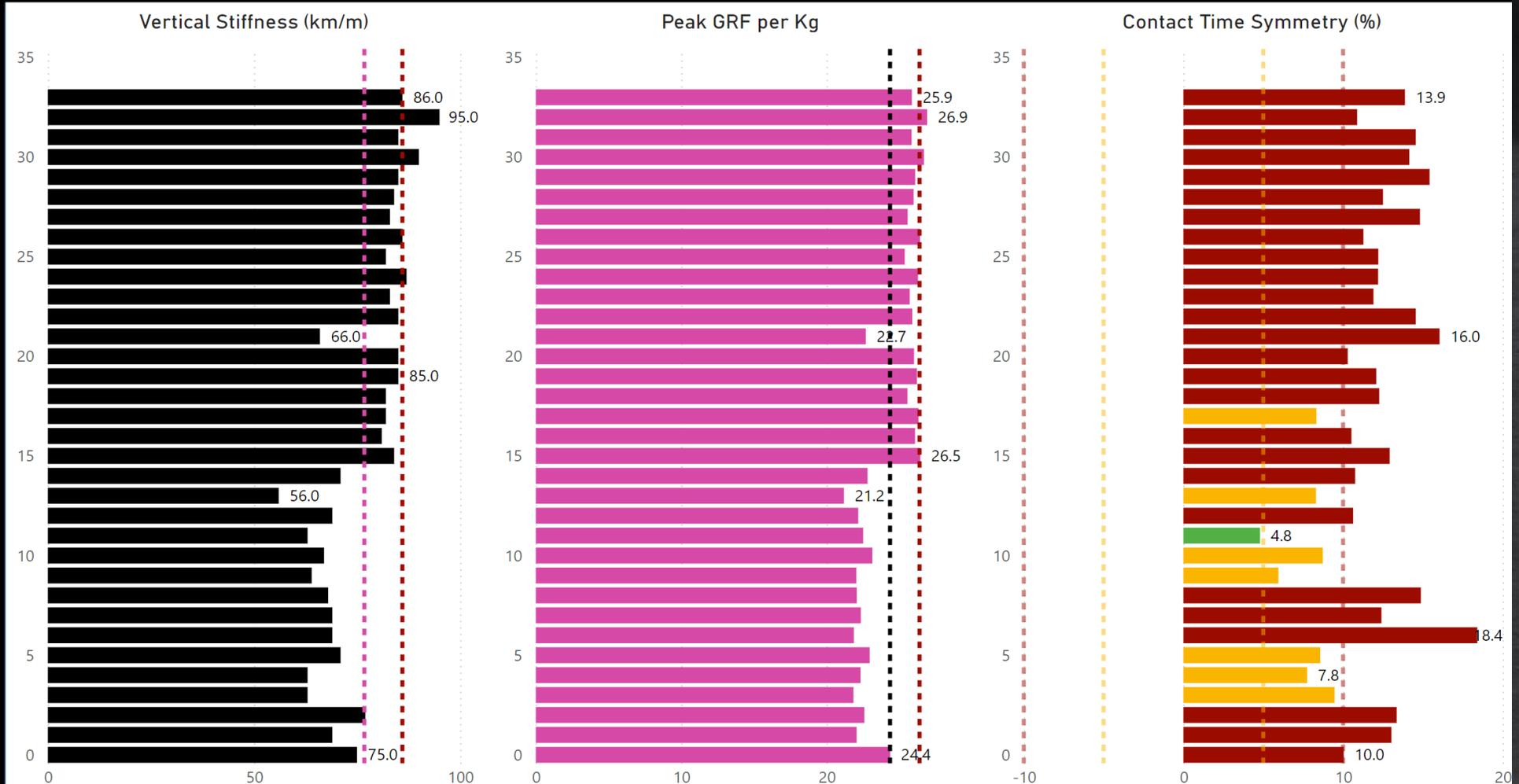
Acute Case Study

ACUTE CASE STUDY

Lockdown Soleus/Calf Acute Incidence

HIIT Session (2mins on 1min Off)
Pre L Soleus G2a; Right Gast.G2b
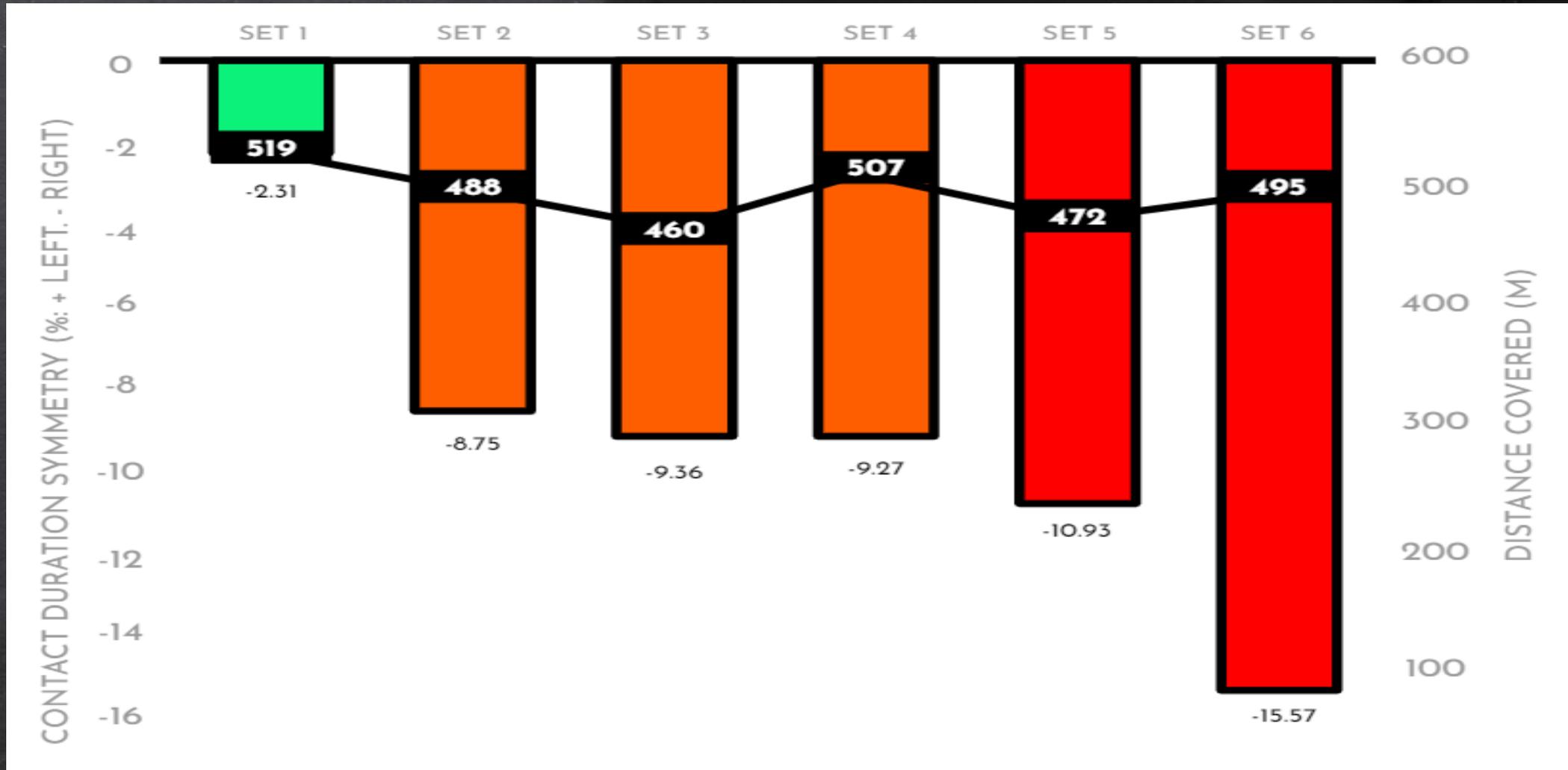
Chronic Case Study

Left Ankle Break

Long Term Rehab Overview
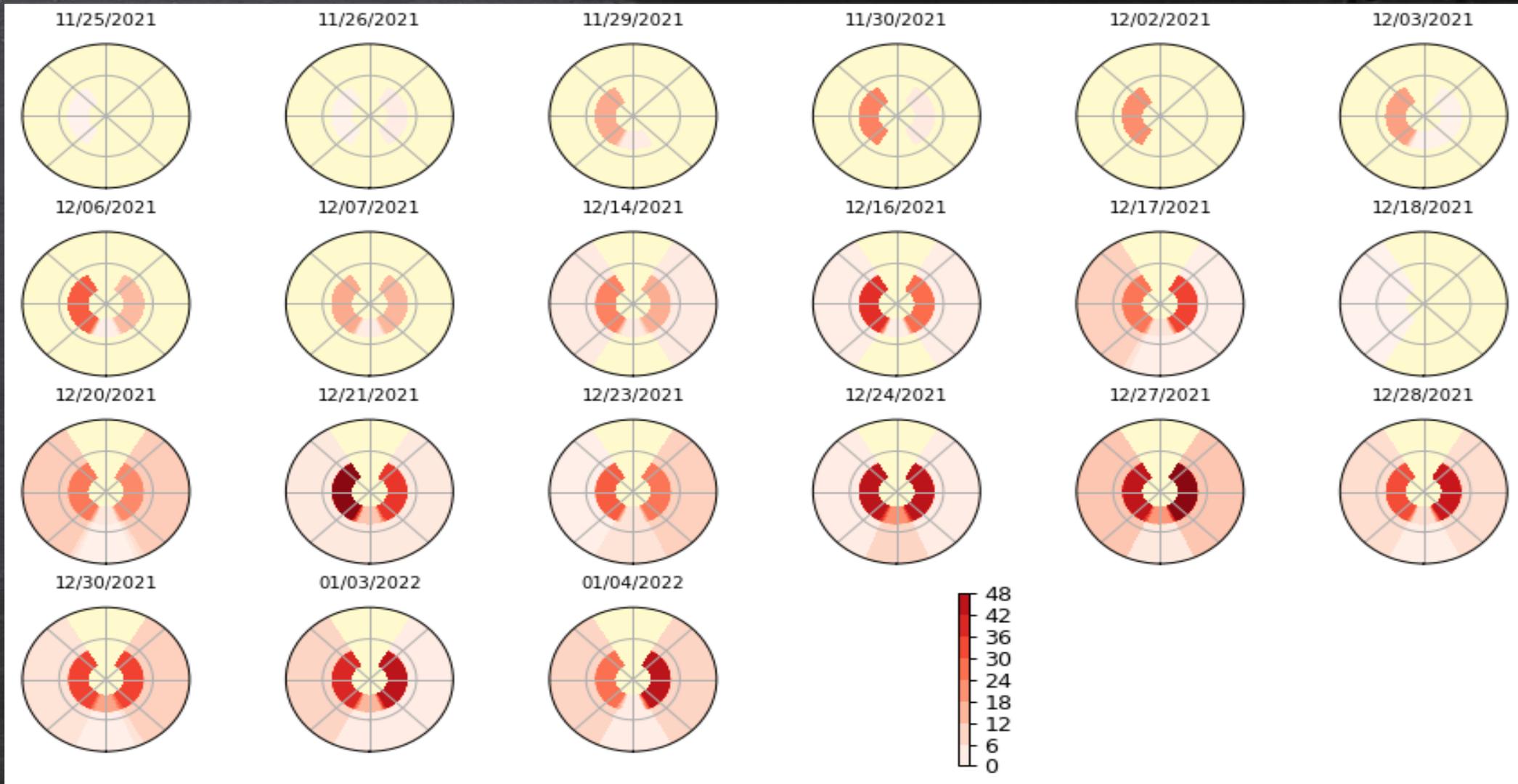
Overview of Mechanical Responses
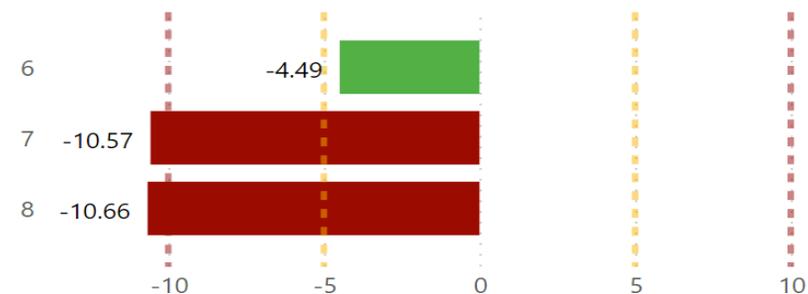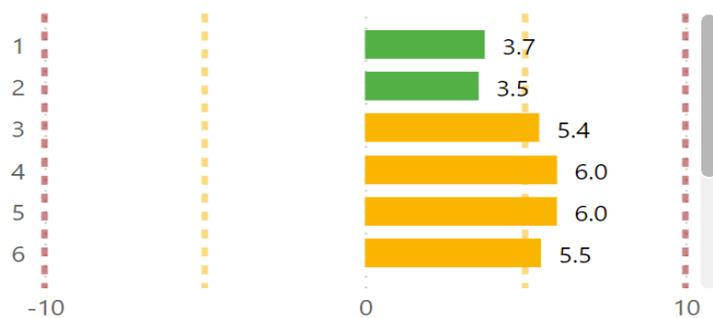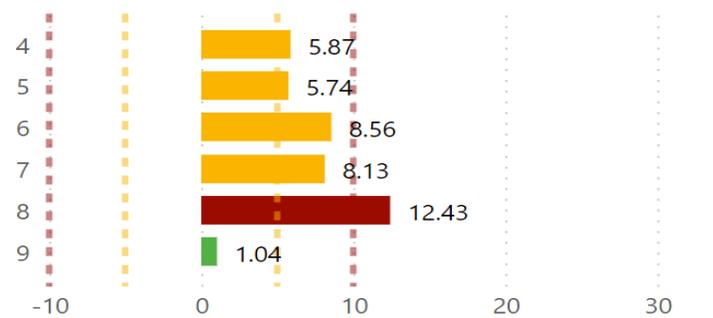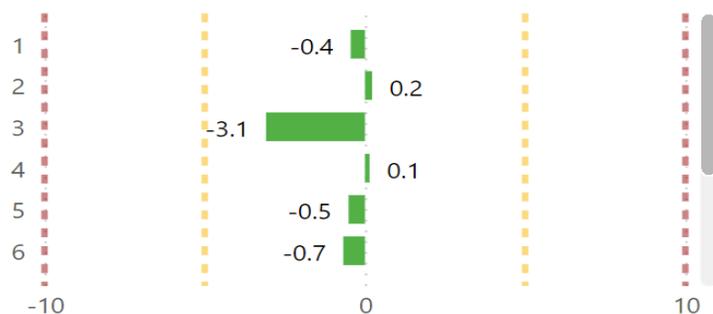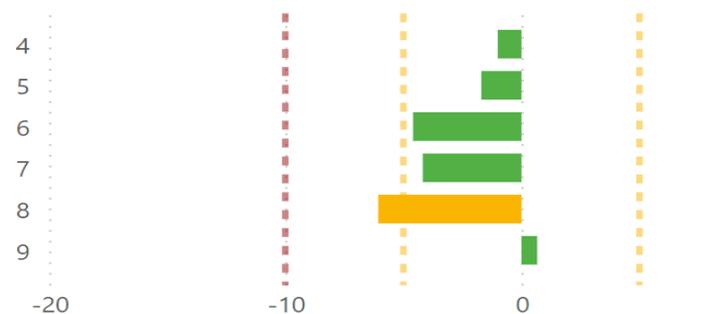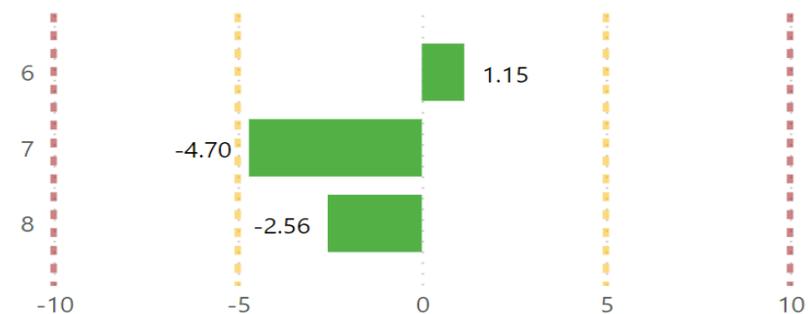
Contact Time: Velocity (In-Field)
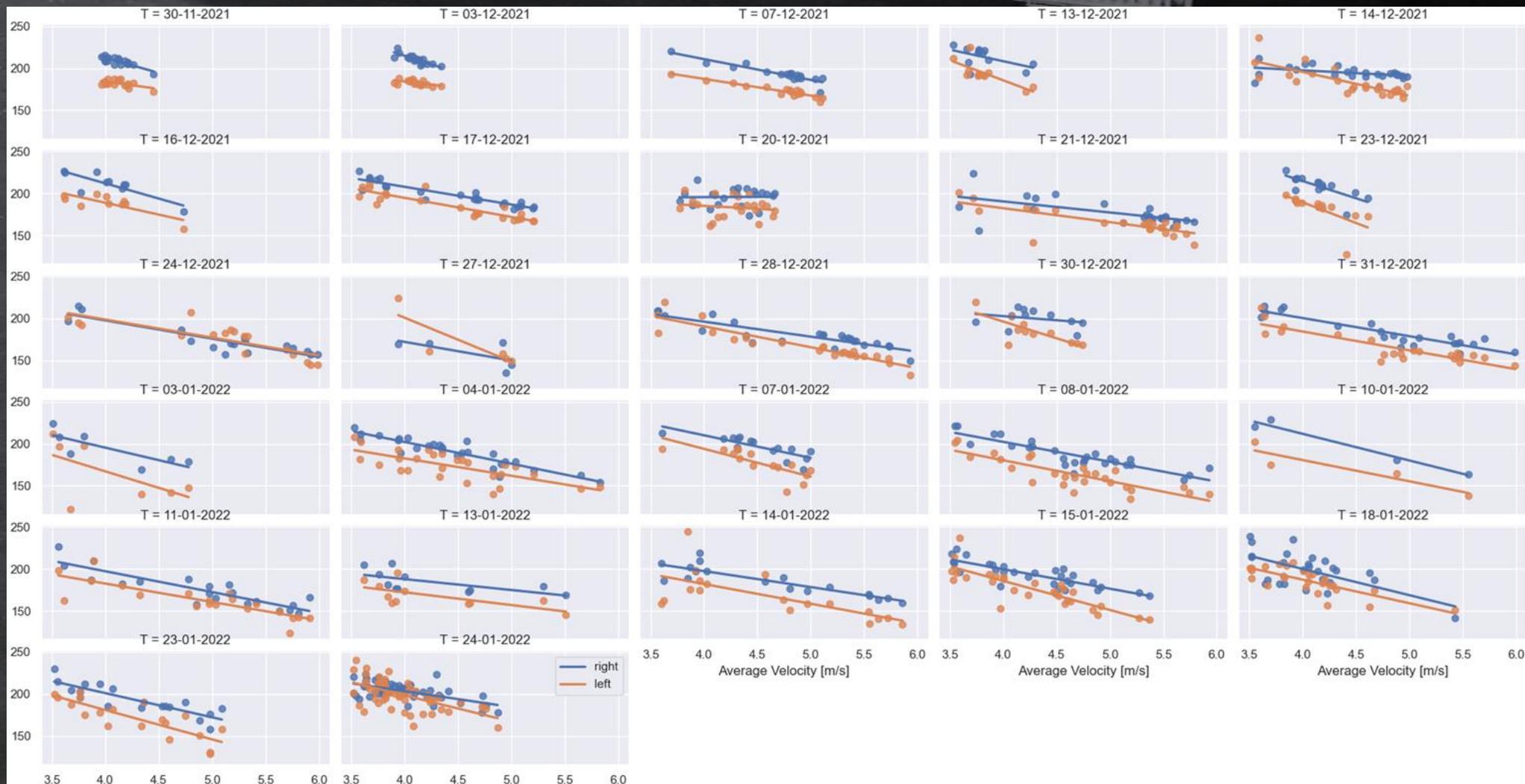
Pre-Post CT:Velocity
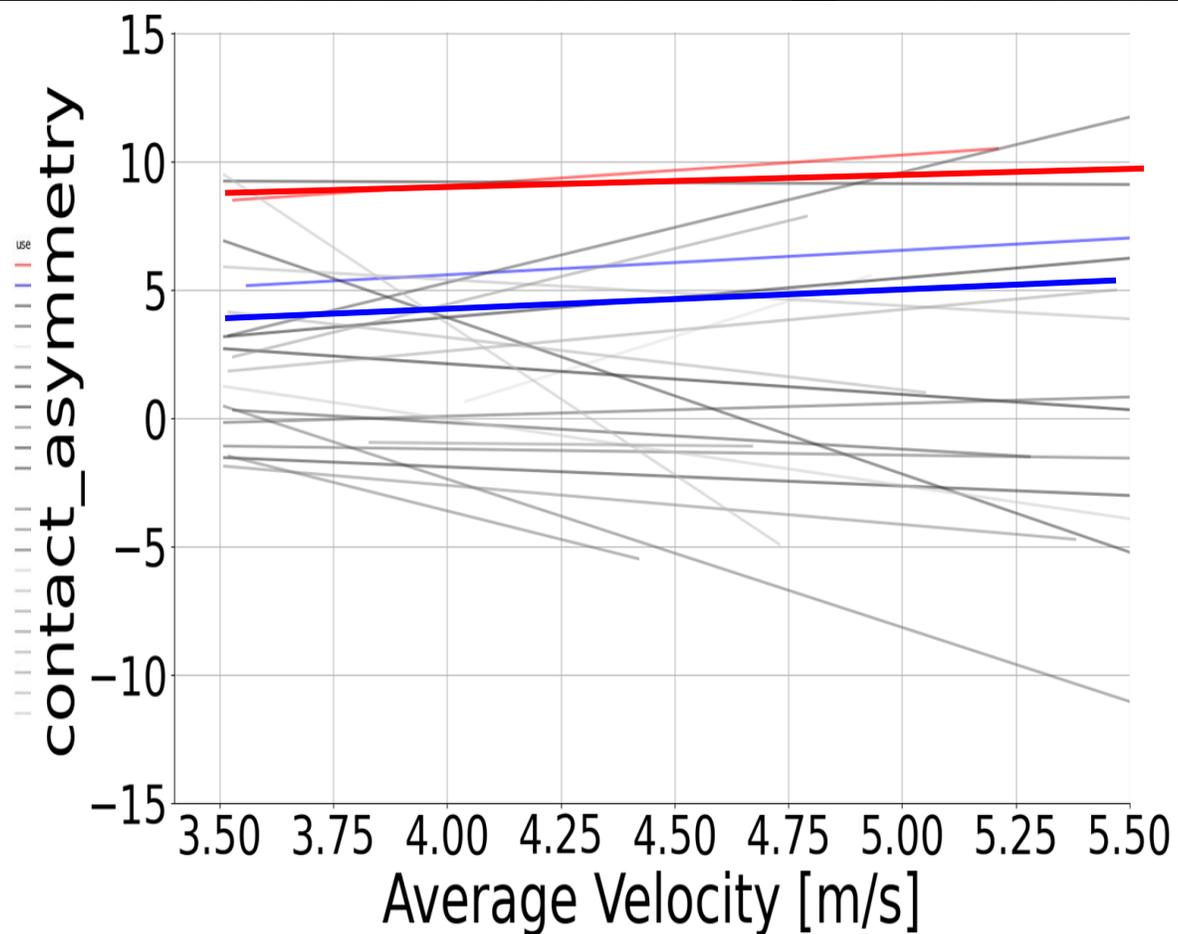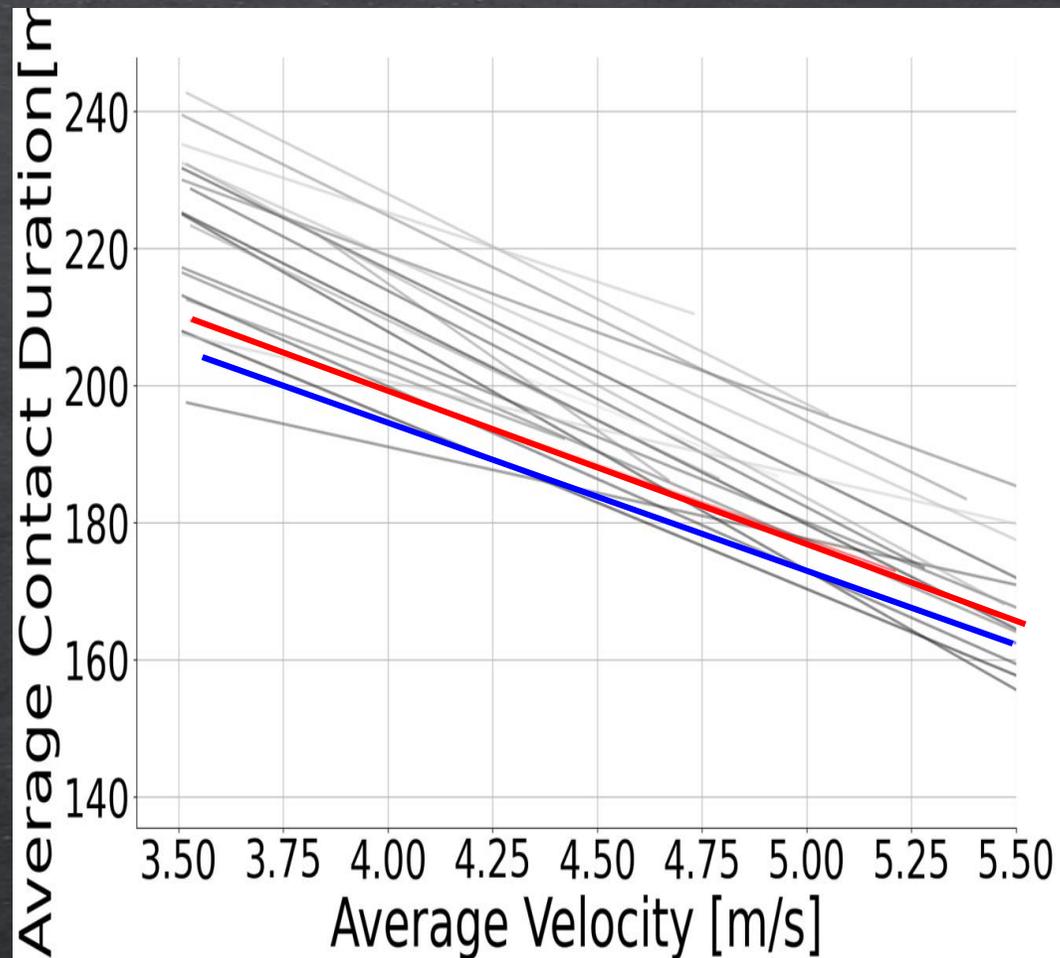
Thanks

Any Questions?

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