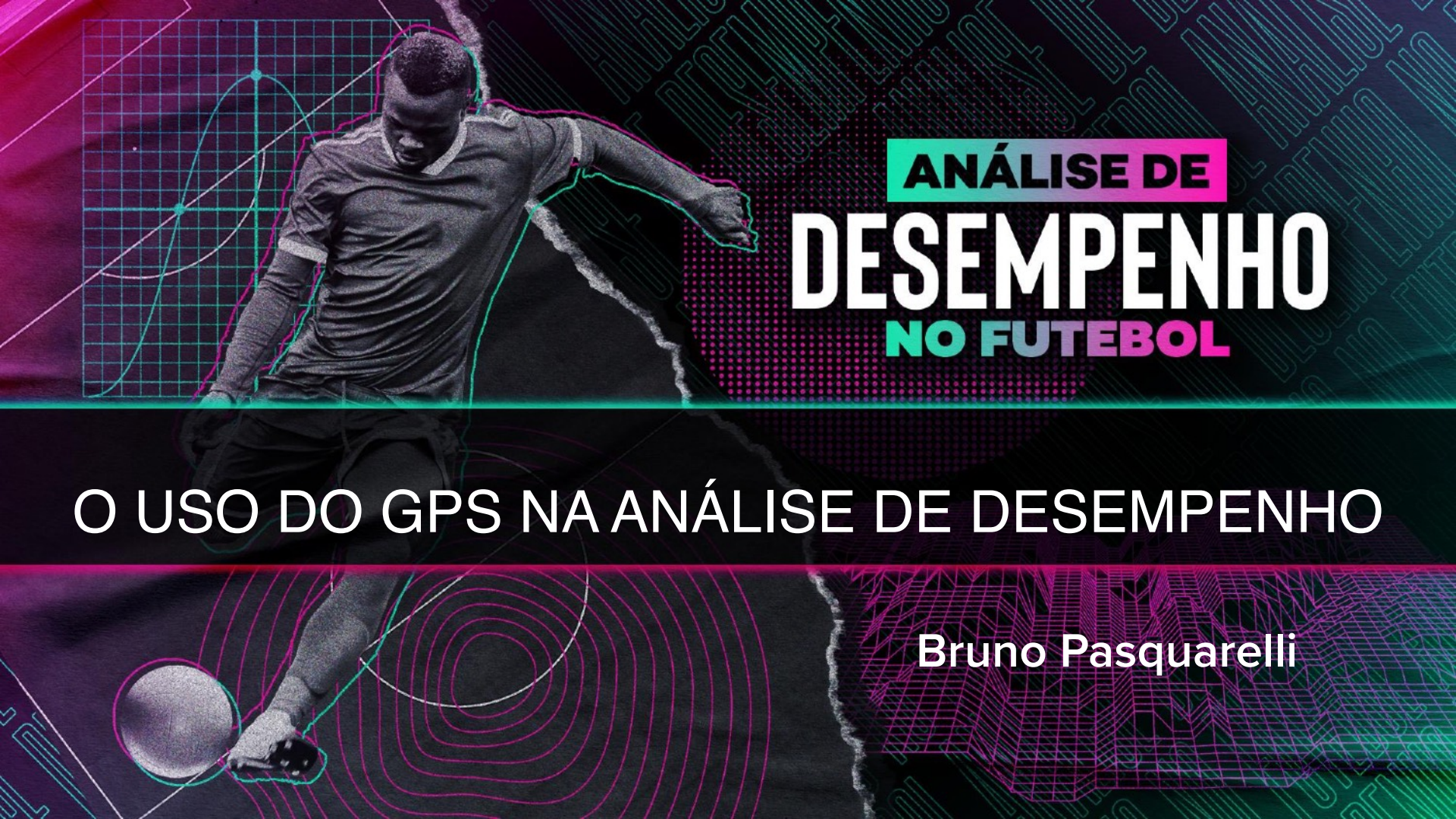




ANÁLISE DE DESEMPENHO NO FUTEBOL

O USO DO GPS NA ANÁLISE DE DESEMPENHO

Bruno Pasquarelli

O USO DO GPS NA ANÁLISE DE DESEMPENHO

Caminho da Aprendizagem

MONITORAMENTO

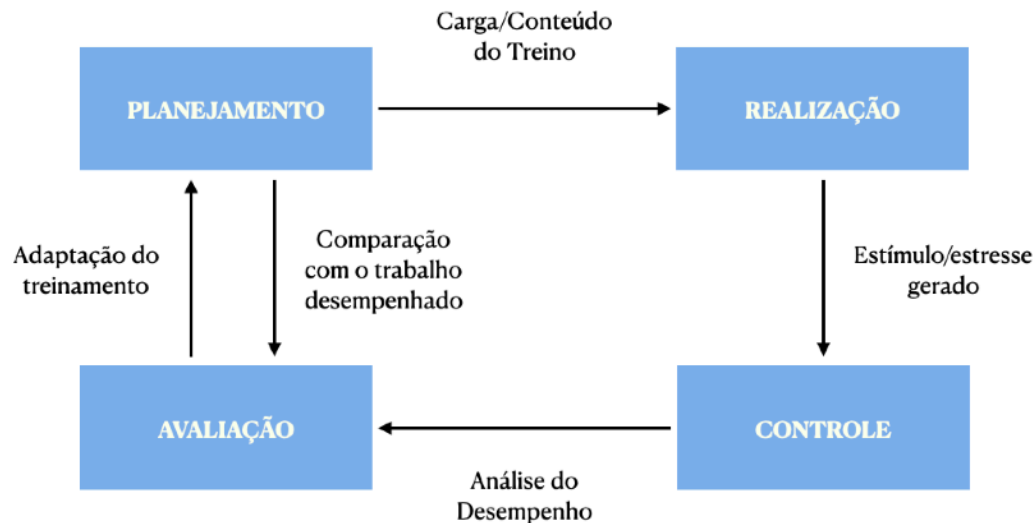
- Dispositivos para análise de desempenho
 - ✓ Cameras
 - ✓ Rastreamento
 - ✓ Sensores vestíveis
 - ✓ GPS - carga locomotora
 - ✓ UMI - carga mecânica

ANÁLISE

- O contexto dos dados
 - ✓ Integração das áreas de conhecimento

USO APLICADO

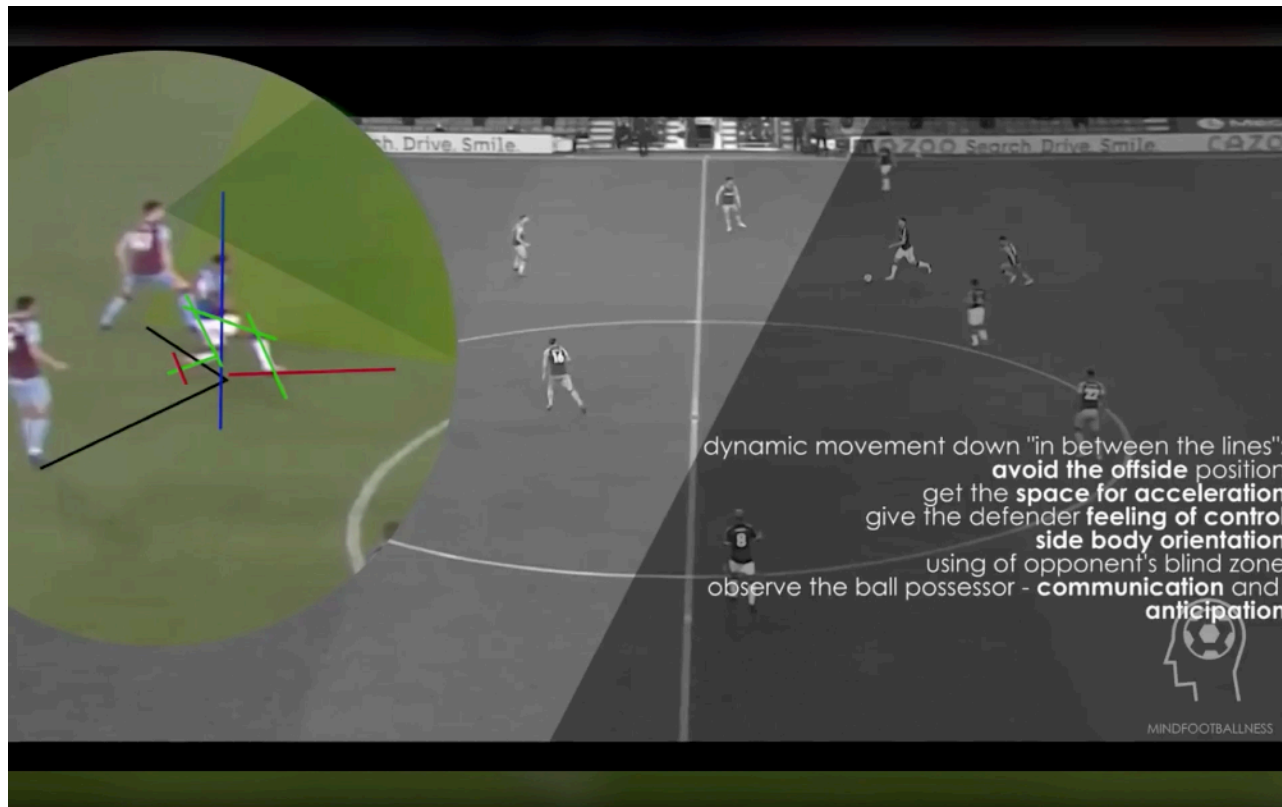
- ✓ Inteligência Coletiva
- ✓ Transferência para o treino/competição



An abstract graphic design featuring a horizontal band with various geometric and organic patterns. On the left, there are concentric teal circles and a grid with a curve. In the center, a dark, irregular shape separates the left and right patterns. On the right, there are orange concentric circles, a grid of small dots, and a circuit-like pattern. At the bottom right, there are 3D wireframe cubes. The word "MONITORAMENTO" is written in white, bold, sans-serif capital letters across the center of the band.

MONITORAMENTO

MONITORAMENTO



Câmeras

*Sistema de Rastreamento Óptico por
Câmeras*

MONITORAMENTO

Sistema de Posicionamento Global

Global Positioning System

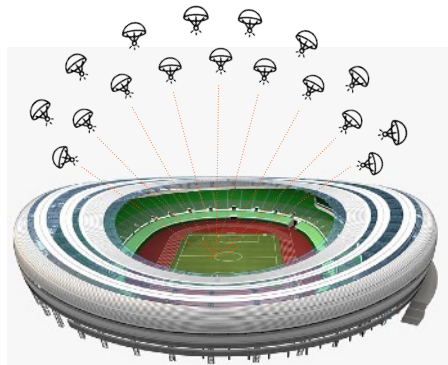
GPS



Sensores de Movimento Inercial

Acelerômetro
Giroscópio
Magnetômetro

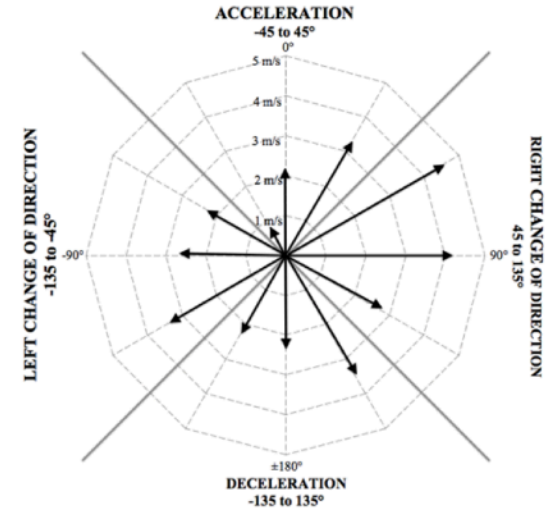
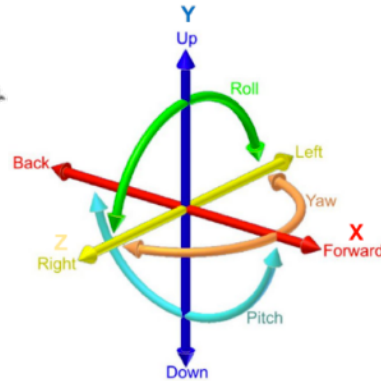
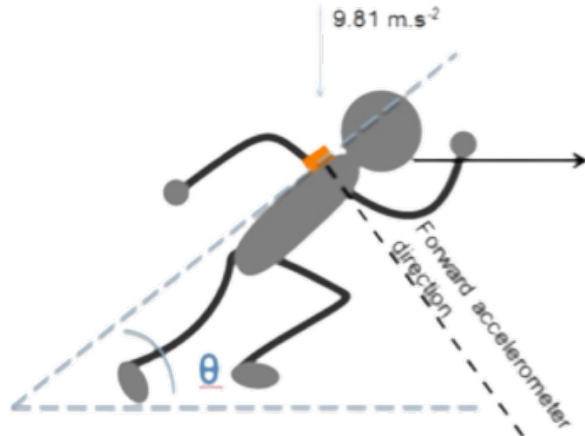




GPS + GLONASS



MONITORAMENTO



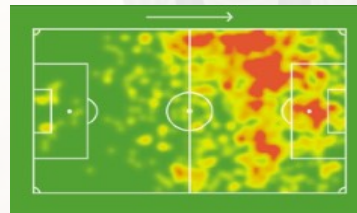
Player Load™

$$\text{Plyr.Load} = \sqrt{\left((fwd_{t=i+1} - fwd_{t=i})^2 + (side_{t=i+1} - side_{t=i})^2 + (up_{t=i+1} - up_{t=i})^2 \right)}$$

MONITORAMENTO

CARGA EXTERNA

Locomotora



67.0
Well balanced

Carga *Interna*

Músculo-esquelética
Mecânica

POSITIONAL

High Speed Running

Acel / Desacel

Distância

Sprints

Satélites

INERCIAL

Player Load™

Saltos

Mudanças de Direção

Quedas dos Goleiros

Acelerômetro

Giroscópio

Manetómetro

HEART RATE

Zonas de Int (min)

FC Max

FC Média

Esforço Cardíaco
Total

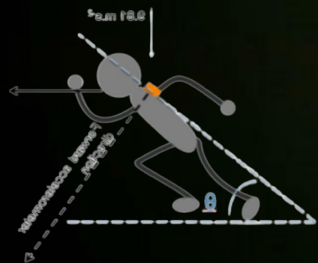
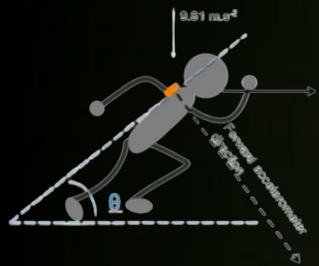
Monitor de FC



An abstract graphic design featuring a dark background with various geometric and mathematical patterns. On the left, there are concentric magenta circles and a cyan grid with a curve. On the right, there is a magenta dotted circle and a cyan circuit-like pattern. At the bottom right, there are magenta wireframe cubes. The word "ANÁLISE" is centered in white, bold, sans-serif capital letters.

ANÁLISE

O CONTEXTO DOS DADOS



O CONTEXTO DOS DADOS



REVIEW ARTICLE

Open Access

Tracking Systems in Team Sports: A Narrative Review of Applications of the Data and Sport Specific Analysis

Lorena Torres-Ronda^{1,2*}, Emma Beanland³, Sarah Whitehead^{4,5}, Alice Sweeting¹ and Jo Clubb⁶



Torres-Ronda et al. *Sports Medicine - Open* (2022) 8:15
<https://doi.org/10.1186/s40798-022-00408-z>

Table 1 Definitions of common tracking metrics

Level	Metric	Definition	Common Measures
1	Distance	Cumulative distance	Total, Relative, Distances in speed/acceleration/deceleration zones
2	Acceleration (2D)	Instantaneous peak rate of positive change in velocity	Maximal/Peak, Average, Distance/Efforts/Time in acceleration zones
	Deceleration (2D)	Instantaneous peak rate of negative change in velocity	Maximal/Peak, Average, Distance/Efforts/Time in deceleration zones
	Change of Direction (2D)	Count and intensity of changes of direction derived from positional data	Total, Percentage Difference Left vs Right, Count in intensity zones
3	Accelerometry-derived load	A manufacturer-specific, modified vector magnitude of 3D acceleration values (expressed in AU)	Total, Relative to time, Relative to distance, 2D (excludes vertical axis), 1D (absolute or relative contribution of individual axes)
	Change of Direction (3D)	Count and magnitude (g) of changes of direction derived from inertial sensors	Total, Percentage Left v Right, Count in intensity zones

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Table 1 Definitions of common tracking metrics

Level	Metric	Definition	Common Measures
	Impacts	A manufacturer-specific metric that provides a count of 3D acceleration values (g) over a threshold	Count and Magnitude of Impacts
	Collisions/ Tackles	A manufacturer-specific metric that classifies collisions specific to the sport	Count and Magnitude of Collisions
	Stride Variables	Accelerometry-derived metrics estimating ground contact time	Contact Time, Flying Time, Vertical Stiffness (KN·m)
	Stride Imbalances	Accelerometry-derived metrics split by left and right side	Percentage Left v Right

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Table 1 Definitions of common tracking metrics

Level	Metric	Definition	Common Measures
	Stride Variables	Accelerometry-derived metrics estimating ground contact time	Contact Time, Flying Time, Vertical Stiffness (KN·m)
	Stride Imbalances	Accelerometry-derived metrics split by left and right side	Percentage Left v Right
Hybrid	Speed	Instantaneous peak rate of position change	Maximal/Peak, Average
	Sport-specific Metrics	Specific machine learning algorithms designed to quantifying movement demands per sport	AMF QB throws, Basketball court transition, IH skating strides, Rugby scrum detection, Soccer GK Left v Right Dive Count
	Metabolic Power	Estimates the energetic demands of high-intensity Level 1 and 2 actions via GPS or LPS data	Metabolic Energy (Cal·kg), Equivalent Distance (distance covered running at constant speed on flat terrain, for a given energy expenditure), Total Metabolic Power (ml·kg·min), Distance/Efforts/Time in Metabolic Power bands

ANÁLISE

Integração das Áreas do Conhecimento



CATAPULT



Focus



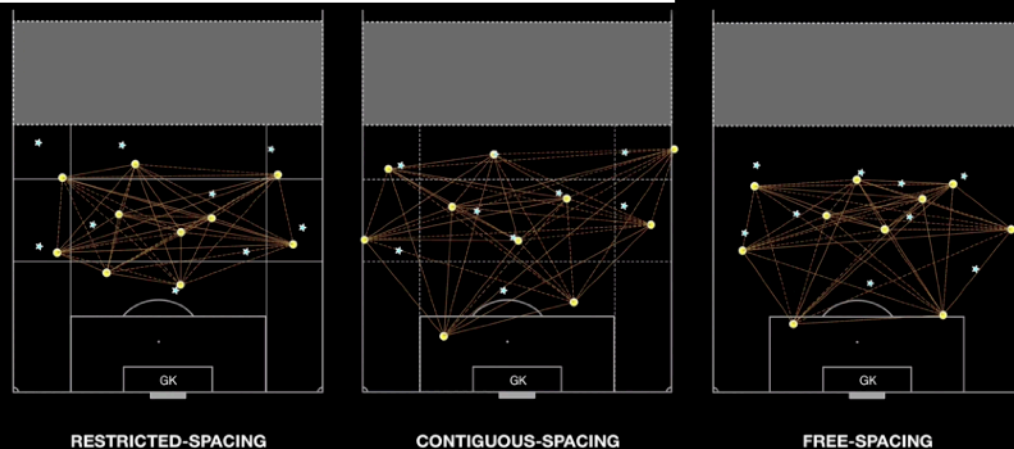
MatchTracker

Integração das Áreas do Conhecimento

> [J Strength Cond Res.](#) 2017 Sep;31(9):2398-2408. doi: 10.1519/JSC.0000000000001700.

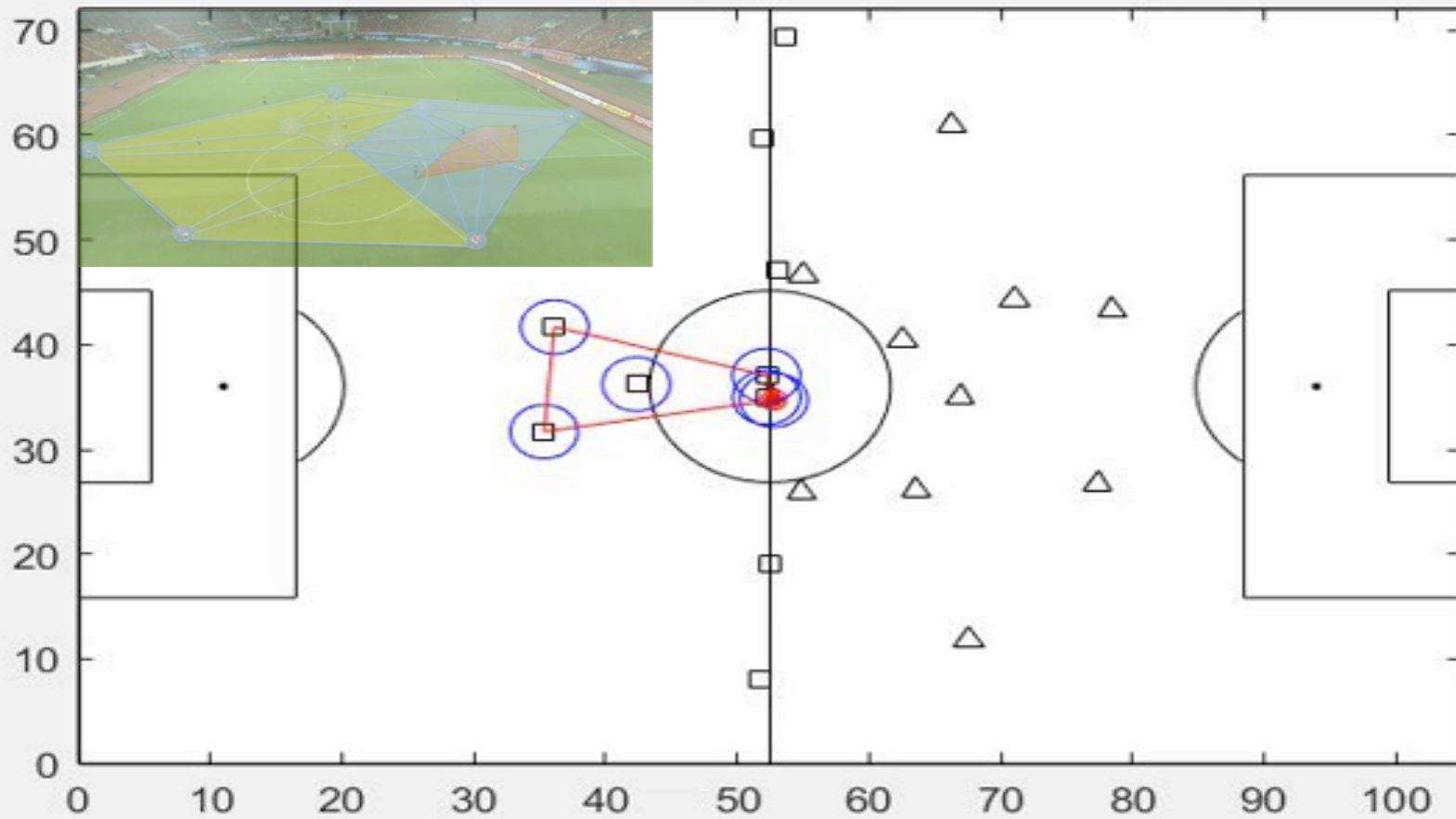
Effects of Pitch Area-Restrictions on Tactical Behavior, Physical, and Physiological Performances in Soccer Large-Sided Games

Bruno Gonçalves ¹, Pedro Esteves, Hugo Folgado, Angel Ric, Carlota Torrents, Jaime Sampaio



Bruno Gonçalves & Jaime Sampaio

Research Center in Sports Sciences, Health and Human Development, CIDESD, CreativeLab Research Community



The image features a horizontal banner with a dark, textured background. On the left, there are concentric magenta circles and a cyan grid with a curve. On the right, there's a magenta dotted circle and a cyan circuit-like pattern. At the bottom right, there are magenta wireframe cubes. The text 'USO APLICADO' is centered in white, bold, sans-serif font.

USO APLICADO

Transferência para o treino/competição



Análises emergentes

- Média & Outliers
- Variações & mínimas mudanças
- Carga Aguda



Olhos de Tigre

Foco
Eficiência

Análises tardias (pós treino/

- Carga crônica
- Monitoramento longitudinal
- Caracterização individual e de sub-grupos
- caracterização dos JR e das tarefas de treino



Olhos de Águia

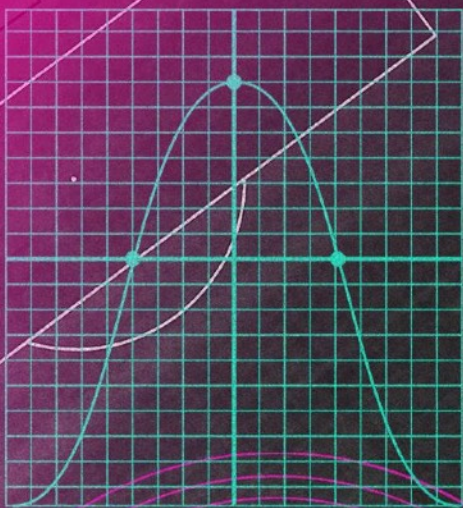
Visão do Todo
Precisão

- Análises espaçotemporais
- Olhando caminhos para criar sinergias e interação dos jogadores
- Planejando o treino para colaborar mais para competir melhor



Olhos de Coruja

Estratégia
Sabedoria



@bpasquarelli



@futebol.da.cabeca.aos.pes

Muito obrigado!



CATAPULT



professor
BRUNO PASQUARELLI

FOOTURE