

# Practical use of technology in golf

& drills to alter movement patterns



# What technology & how they work

- Video → mobile phones and high-speed cameras
- Launch monitors → TrackMan, GC Quad, FlightScope, FullSwing KIT, etc.
- Sensor based 3D motion capture → Bull 3D, AMM 3D, K-Coach (K-vest)
- Optical 3D motion capture → Gears, ENSO
- Pressure plates → SAM, BodiTrack, SwingCatalyst
- Force plates → GASP, Smart2Move, SwingCatalyst
- AI driven platforms and mobile applications



# Video

- Mobile phones
  - Frames per second
  - Shutterspeed
  - Lighting
  - App use
  
- High speed cameras
  - Frames per second
  - Shutterspeed
  - Aperture
  - Lighting



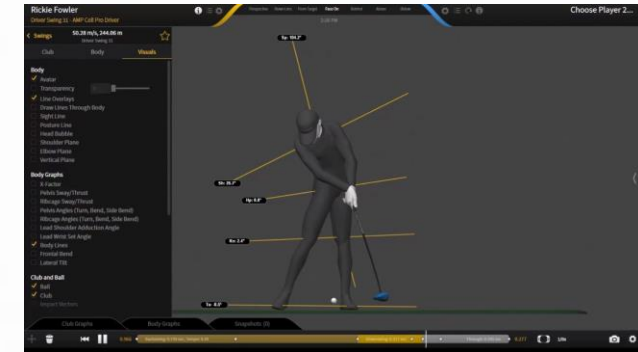
# Launch monitors

- Launch monitors – Doppler radar vs. Optical
  - DR → TrackMan, FlightScope, Golfzon Wave and Full Swing KIT.
    - Can track in the dark (excl. OERT)
    - Tracks the full ball flight\*
    - Dependent on radar waves (+ algorithms)
  - Optical → Foresight (Quad & GC3), SkyTrack and Uneekor
    - High speed camera
    - Infrared camera
    - Measures A to B
    - Dependent on ball flight algorithms
  - Is the best of both possible?
    - Rapsodo
    - TrackMan iO



# 3D Motion capture

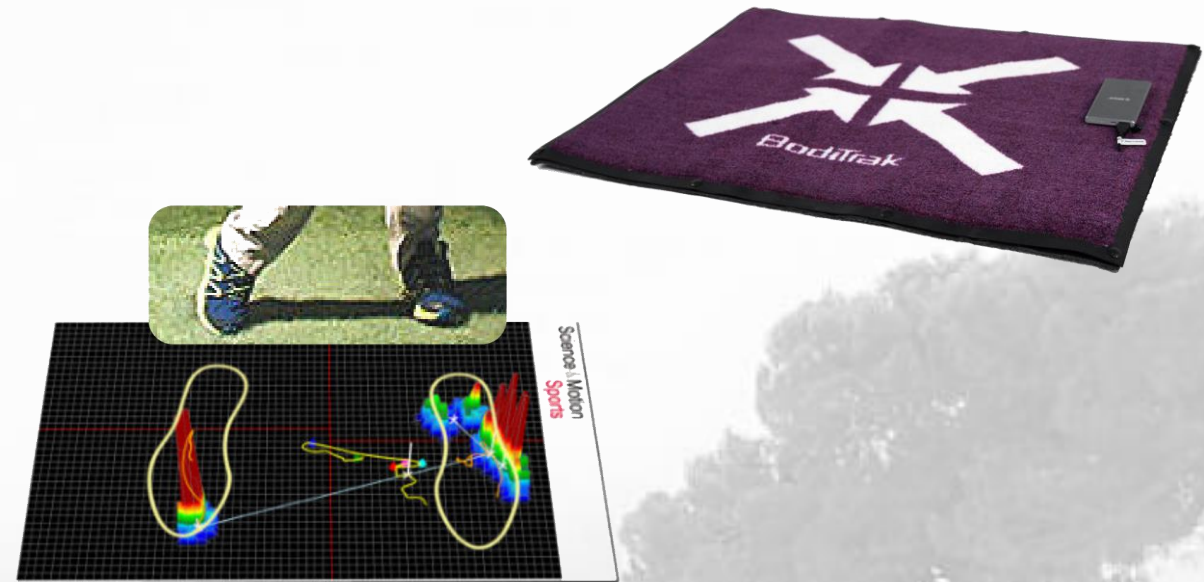
- 3D Motion Capture – Sensor based
  - Inertia sensor
    - K-Coach
    - Hack Motion (wrist only)
    - 4D Motion
  - Electromagnetic
    - Bull 3D → Pholhemus, Viper
    - AMM → Pholhemus
    - Golf BioDynamcis
    - Jacobs 3D
- 3D Motion Capture – Optical based
  - ENSO (10 cameras + markers on shaft & CH)
  - Gears (8 cameras + 28 markers)
  - 3D Motion Capture – Markerless?



# Pressure plates

## Pressure only! (not CoM)

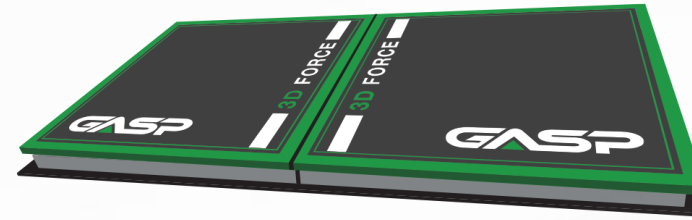
- BodiTrack
  - Portable pressure mat
  - Heatmap
- Science And Motion (SAM, Putt Lab).
  - Studio only plate
  - Over 2100 sensors
  - Heatmap
- Swing Catalyst Balance Plate
  - Studio only plate (portable is coming)
  - Over 2000 sensors
  - Heatmap



# Force plates

## Forces vs. pressure...or both

- GASP
  - Full 3D force measurement
  - Pressure trace – no heatmap
  - Video sync
- Smart 2 Move
  - Full 3D force measurement
  - Pressure trace – no heatmap
  - Poor video sync
- Swing Catalyst Motion / Dual Motion plates
  - Full 3D force measurement
  - Pressure trace – full heatmap (patent)
  - Video sync



# AI driven technology

- Sportsbox AI → 3D Motion Capture app
  - AI need to learn how to find the joints
  - Calculates CHS
  - Calculates Vertical force/vector
  - More samples = better data → improved learning
  - Validation against AMM → accurate?
- Full Swing KIT
  - System learns from sample data
  - Algorithms improve over time
- TrackMan Tracy
  - System learns from sample data
  - Algorithms improve over time
- Who is next?





# The future

- Sportsbox AI – Markerless 3D Motion Capture APP
- SwingSense 3D – Markerless 3D Motion Capture APP
- Motion 2 Coach - Markerless 3D Motion Capture APP
- Watch it Golf → cost saving?
- OnForm Coaching → better communication
- CoachNow → better communication
- Skillest → larger reach and increased revenue
- Istruzi → do it all?
- TrackMan Coaching?
- Other platforms?



# What is best practice for use?

- Video
  - Angles matters → perspective matters
  - Pattern vs. match ups
- Launch monitors
  - Impact receipt
  - Ball flight is only part of the answer
- 3D Motion Capture
  - Movement quantified
  - How does the number match your preferences?
  - What are the references?
  - Kinematics
- Ground Reaction Forces / pressure map
  - Reaction – not action (easy to calculate)
  - Motion ← Force ← Intent
  - Kinetics



# How do we facilitate progress?

- What are we looking to change?
  - What – How – Why
- What are the goals for movement?
  - Anthropometrics
  - Mobility
  - Coaching history
  - Physiology
- What are the goals for skill?
  - Time – Challenge – Variation
  - Is skill measurable?
- Access to technology
  - Which feedback are we looking for?
  - Distractions



# Let's discuss!

- What technology is the most important?
- What technology is mostly misunderstood?
- Which technology do you wish you could work with?
- What do you wish technology could show you?

