TechBall Educational Material

(Digital Tools and Artificial Intelligence in Basketball)

Project: Integration of Smart Technologies into Basketball Training

Project acronym: TechBall

Partner: Serbian E-sports Federation

Date: 01. September 2026.

Subject: Analysis of the Technological Readiness and Needs of Sports Coaches

Scope: Serbia, Croatia and Slovenia

Author: Jovan Vujosevic and Dalibor Marinovic





Disclaimer / Statement

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them

TABLE OF CONTENTS

Purpose and Learning Outcomes 7
How to Use the Material 7
Introduction 7
1. Foreword 8
1.1. Why Digital Tools in Basketball 9
1.2. Questions Before Investing 9
1.3. Sports and Administrative Tasks 9
1.4. Link to Coaches' Needs 10
2. Research Findings and Their Interpretation 10
2.1. How to Use These Findings 11
2.2. Barriers and Training Priorities 11
2.3. Requested Training Areas 11
2.4. Baseline Digital Practice 12
2.5. Basic Concepts and Problem Selection 12
2.6. Understanding the Problem Comes Before Selecting the Tool 12
2.7. Measurement Does Not Replace Explanation 12
3. What a Leader Should Know About Artificial Intelligence 13
3.1. Eight Topics for Managers 13
4. Procured Equipment and Procurement Value 13
4.1. Link to the Research Findings 14
4.2. What the Inventory Means for the Training Plan 14
4.3. Kit Contents and Organization of Use 14
4.4. Inventory for Operational Use 15
4.5. Preparation Before the First Workshop 15
5. Heart Rate and Response to Light Signals 15
5.1. Polar Verity Sense 15
5.2. WittySEM 16
5.3. Discussion Question 16
6. Timing and Jump Analysis 16
6.1. Witty wireless timer 16
6.2. One-Metre OptoJump Next Kit 17
6.3. Interpreting Results 17
7. Video Analysis in Basketball 17
7.1. A Procedure a Coach Can Apply Immediately 17

7.2. Veo as an Example of a Recording System 18
8. Specific Tools and Selection Criteria 18
8.1. The Demo Should Resemble Real Work 19
8.2. Selecting According to the Problem 19
9. Tool Selection and Organizational Readiness 19
9.1. Selection Criteria 19
9.2. Small Clubs and Larger Organizations 20
9.3. When to Postpone Implementation 20
10. Four Pillars of Readiness: Culture and People 20
10.1. Culture of Sports Clubs and Federations 20
10.2. Human Resources and Talent 20
10.3. Team Agreement 21
11. Four Pillars of Readiness: Data and Infrastructure 21
11.1. Data Linked to Purpose 21
11.2. Infrastructure Supporting Day-to-Day Work 21
11.3. The Budget Follows the Four Pillars 22
11.4. Readiness Assessment: Questions for the Team 22
11.5. Organizational Culture 22
11.6. People and Skills 22
11.7. How to Collect Evidence 22
12. Readiness Assessment: Data and Technical Conditions 23
12.1. Data 23
12.2. Infrastructure 23
12.3. Gap Register 23
13. Selecting Initiatives with the Greatest Practical Value 24
13.1. Impact and Required Effort 24
13.2. Starting with One Initiative 24
14. Short-Term Strategy and Long-Term Goals 25
14.1. Three Questions for Strategy 25
14.2. Two Parallel Workstreams 25
14.3. Strategy on One Page 25
15. Small Clubs and Large Federations 26
15.1. People and Culture 26
15.2. Collaboration Instead of Duplicating Resources 26
16. Process Improvement, Automation and Support for People 27

16.1. Organize the Process First 27
16.2. Automation of Routine Tasks 27
16.3. Augmenting Human Capabilities 27
16.4. Example Workflow After Testing 27
16.5. Measuring Process Benefits 27
16.6. Budget and Affordable Solutions 28
16.7. Starting with Existing Resources 28
16.8. How to Check Economic Justification 28
16.9. Before a New Purchase 28
17. Data and Responsible Use of Artificial Intelligence 29
17.1. A Record That Can Be Verified 29
17.2. Example Task for a Generative AI Tool 29
17.3. Access Rules in the Club 29
18. Data Preparation and Responsible Governance 29
18.1. Four Practical Requirements 30
18.2. Existing Models and Synthetic Data 30
18.3. Regulations Apply According to Context 30
19. Action Framework: Assessment and Priority Setting 30
19.1. Step 1: Assessment of Internal Capabilities 30
19.2. Step 2: Understanding AI and Setting Priorities 31
20. Action Framework: Skills and Data 31
20.1. Step 3: Developing Skills and Professional Networks 31
20.2. Step 4: Preparing Data for the Selected Solution 32
21. Action Framework: Internal Team and Partnerships 32
21.1. Step 5: Employee Development and External Expertise 32
21.2. Step 6: Managing Costs Through Collaboration 33
22. Practical Training Programme 33
22.1. Workshop Organization 34
22.2. Learning After the Workshop 34
22.3. Checking Understanding 34
23. Action Plan and Success Review 34
24. Success Indicators 35
25. First-Use Card 35
26. Timeline and Process Repetition 35
26.1. Proposed Annual Cycle 36

26.2. Monitoring and Adaptation 36
How to Use This Manual 38
1. Procurement Overview and Critical Checks 38
1.1. Mandatory Checks upon Handover 38
2. Inventory of Components by Quotation 39
2.1. Proposed Labelling System 39
3. Preparing the Space and Session 40
3.1. Before the Group Arrives 40
3.2. Working with Players 40
3.3. Comparison Rules 40
3.4. After Completion 40
4. Polar Initial Setup and Live Operation 40
4.1. Initial Setup 41
4.2. Wearing the Sensor on the Arm 41
Live Monitoring 41
5. Polar Recording and Working with Ten Sensors 41
5.1. Recording Without a Phone During Training 41
5.2. Organising the P01 to P10 Sensor Set 42
6. WittySEM Preparation and Connection 42
6.1. Setting Up the Station 43
6.2. Selecting the Control Method 44
6.3. What Is Measured 44
7. WittySEM Basketball Drills 44
7.1. SEM 01 Stationary Signal Selection 44
7.2. SEM 02 Lateral Movement and Stopping Control 44
7.3. SEM 03 Dribbling and Choice Reaction 45
8. Witty Timer and Sprint Measurement 45
8.1. Preparing the Timing Gates 45
8.2. TB SP10 Proposed 10 m Test 45
9. Witty Data Storage and Troubleshooting 46
9.1. Transfer via Witty Manager Software 46
10. OptoJump Setup and Trial Test 46
10.1. Connection 47
10.2. Before the First Jump 47
11. OptoJump Jump Protocols 47

11.1. OJ CMJ Countermovement Jump 49
11.2. OJ SJ Jump from a Held Position 49
11.3. Reading the Results 49
12. Results and Consolidated Report 49
12.1. One Row per Attempt 49
12.2. Brief Report for the Coach 50
12.3. Access Protection 50
13. Maintenance and Checklists 50
13.1. Polar After Each Use 50
13.2. Witty and OptoJump 50
13.3. Pre-Use Checklist 50
13.4. Post-Use Checklist 51
13.5. Periodic Inspection 51
14. Forms for Practical Work 51
14.1. Session Record 51
14.2. Handover and Service 51
14.3. Protocol Card 52
15. Documentation and Final Training 52
15.1. Technical Sources 52
15.2. Practical Competency Assessment 52
16. Recording and Video Analysis in Basketball Using Veo Cameras 53
16.1. Models, Applications and Initial Access 53
16.2. Initial Activation 54
16.3. Indoor Setup 54
16.3.1. Choosing the Position 54
16.3.2. Mounting and Stability 55
16.3.3. Quick Frame Test 55
16.4. Connection and Recording 55
16.4.1. Controlling the Camera by Phone 55
16.4.2. Starting and Stopping Recording 56
16.4.3. Naming Convention 56
16.5. Uploading Recordings and Checking Processing 56
16.5.1. Connect the Camera to the Internet 56
16.5.2. Track Two Separate Steps 56
16.5.3. Check Before Closing the Task 57
16.6. Video Analysis and Clips 57
16.6.1. Select the View 57
16.6.2. Create a Clip 57
16.6.3. Feedback That Leads to a Drill 57

16.6.4. Limits of Automated Analytics 57
16.7. Practical Application in Basketball 58
16.7.1. 20-Minute Meeting....58
16.7.2. Comparable Records 58
16.8. Live Streaming 58
16.8.1. Requirements and Start-Up....59
16.8.2. Test Before the First Live Stream....59
16.9. Troubleshooting and Maintenance....59
16.9.1. Operator Routine....60
16.10. Checklist and Record Keeping....60
16.11. Event Record 61

Purpose and Learning Outcomes

The material links coaches' needs with technology selection, work organization and the use of equipment in basketball. The main recommendation is to connect procurement with practical training, clear protocols and verification of benefits within the club. Survey results show a higher stated readiness to introduce artificial intelligence than the availability of tools in the working environment..

- Distinguish sensor-based measurement, video analysis, data processing and artificial intelligence.
- Prepare a task using the procured equipment and identify the limitations of the results.
- Read the research findings without overstating their applicability.
- Develop a plan for training, responsibilities, budget and monitoring of results.

How to Use the Material

Managers of clubs and federations can begin with a readiness assessment, selection of priorities and resource planning. Coaches and operators then use the sections on equipment, standardization and practical training. The shared task is to turn a finding into a verified decision and a repeatable way of working.

The guide covers digitalization of work, the basics of artificial intelligence, the four pillars of readiness, TechBall research findings, procured equipment, a pilot programme and an organizational development plan. Organizational recommendations and working templates are intended to be adapted to the conditions of a particular club.

Introduction

Dear colleagues, presidents of sports organizations and decision-makers, we present the TechBall educational material, designed to help sports clubs and federations understand and assess the opportunities offered by digital technologies and artificial intelligence. The guide provides guidance on preparing the organization, selecting tools and using them, while carefully considering benefits, costs and challenges.

Technology can contribute to productivity, better organization and knowledge sharing. Its application includes automating certain administrative tasks, organizing data, preparing reports and supporting training analysis. Potential savings and improvements are not guaranteed in advance: they must be

verified in the specific club, including the time employees spend preparing, checking and maintaining the system.

Machine learning, computer vision and natural language processing open up different possibilities for sport. However, the availability of technology alone does not mean that an organization is ready to use it. People who understand the task, well-organized data, clear responsibilities and infrastructure that supports day-to-day work are required. For this reason, the guide gives equal attention to equipment, knowledge and organization.

The TechBall research, based on 121 valid responses, shows that equipment and finances are the most frequently cited barriers. Lack of equipment is reported by 72 respondents, while financial constraints are reported by 66. The basics of artificial intelligence are identified as a training need by 67 coaches, while 49 respondents each cite sensor use and data interpretation. These findings provide a direct direction for the development of practical education.

The procurement of ten Polar Verity Sense sensors, a WittySEM kit, a Witty timer and an OptoJump Next system has created the conditions to address part of these needs through work with real devices. It is now necessary to organize access to the equipment, train operators and introduce repeatable procedures. The goal is for every result to be understandable and useful to the coach.

We want TechBall to encourage the development of a community in which clubs, federations, coaches and expert partners share experience. Joint workshops, accessible protocols and post-training support can contribute to more equal access to knowledge and equipment. This approach links digital development with the real needs of sport.

We thank the TechBall team, the authors and the coaches who participated in the research. We wish everyone successful practical use of the guide.

1. Foreword

The digital transformation of sports clubs and federations involves changing the way they work, learn and make decisions. Artificial intelligence can help identify patterns, prepare content and process information, but its value depends on whether it addresses a real problem. This material helps managers and coaches prepare for such use and develop their own realistic plan.

The first challenge is the pace of technological change. Tool functions, terms of use and required skills change, so the organization must retain the ability to adapt. We therefore recommend short planning cycles and result reviews, with clearly defined responsibilities and a limited initial scope.

The second challenge is the breadth of possible applications. Digital tools can be used in coaching, administration, communication, education and planning. Generative tools allow requests to be entered in ordinary language, which makes it easier to get started. However, a simple interface does not remove the need for expert knowledge and verification of answers.

The third challenge is responsible practice. Automating a routine task can free up time, but processing player data raises questions of privacy, access and security. It is necessary to define in advance the purpose of use, the person who checks the result and the limits of decisions that may rely on the tool.

The fourth challenge is uncertainty. An organization does not have to know every future use of technology in advance. It should, however, be able to ask a good question, run a small pilot, identify errors and document the experience. An unsuccessful attempt can be useful if it is limited, conducted safely and makes clear what has been learned.

The fifth challenge concerns people. Employees need to understand how tasks are changing, which skills are being developed and what support they can expect. A culture of curiosity, critical thinking and collaboration is more important than uncritical acceptance of every new application. Management sets goals and working conditions; experts help with selection and technical implementation.

In the TechBall research, the average self-assessment of digital skills is 3.61, readiness to introduce AI is 3.80, and availability of tools is 2.83 on a scale from 1 to 5. The guide therefore links knowledge development with access to equipment and practical tasks. The goal is not for everyone to become a programmer, but to use data reliably in their part of the work.

The following sections move from understanding the problem to selecting tools, training and assessing success. Adapt the proposed procedures to your club, the age of the athletes and the resources available. Technology should support the quality of work, while professional responsibility remains with people.

1.1. Why Digital Tools in Basketball

Digital tools and artificial intelligence are becoming part of everyday services and business applications. A sports organization should therefore identify where it already uses them, where they can help and where additional complexity would be unnecessary. A systematic approach begins with understanding the problem and then assessing possible solutions.

As a manager, president or owner who wants to prepare your sports organization for an AI-based environment, you face conflicting information about the benefits and risks of AI. Should the focus be technical or strategic? Is this good news or bad news? You may want nothing to do with AI because you fear investing in the wrong technology or exposing the sports organization to financial risks from the required investments. If initiatives do not produce the expected result, this may have negative consequences for the sports organization. Employee uncertainty about changes in job tasks can further intensify these concerns.

1.2. Questions Before Investing

Is the problem a lack of information or a lack of agreement? Does the coach already have the data but lack time to review it? Are the same data entered into several records? Is the analysis so delayed that it can no longer influence the next training session? The answers indicate whether what is needed first is a new tool, an orderly process or a clear division of responsibilities.

In basketball, digital tools can connect the training plan, video recording, measurements and feedback. A club, for example, can record the same test in a shared form, find the corresponding video attempt and add the coach's explanation. The value lies in linking information to a decision while monitoring its reliability.

1.3. Sports and Administrative Tasks

In addition to training and competition, a club keeps membership records, schedules, documentation, invoices and deadlines. Digitalization of these tasks can be a first step even when AI is not yet being used. A well-organized calendar solves the problem of missed deadlines; a single table can remove duplicate data entry. For more complex tasks, assistance with classifying documents or drafting reports may be considered, subject to review by a responsible person.

An example of an initial task is preparing a weekly report for the coaching staff. First record how much time is spent collecting and checking data. Then standardize the form and labels. Only when the content

is organized should you assess whether a generative tool can help write the summary. This separates the benefit of automation from the benefit of organizing the data itself.

1.4. Link to Coaches' Needs

The TechBall survey shows that video analysis is a more familiar practice than AI and advanced sensors. It is therefore useful to build training from a familiar task toward a new one: from reviewing footage to agreeing on labels, from a tidy table to interpreting measurements, and only then to checking an automated summary. This is a proposed teaching approach based on the described sample, not proof that all clubs have the same needs.

2. Research Findings and Their Interpretation

The report “Digitalization and Application of Artificial Intelligence in Sport,” authored by Jovan Vujošević, is dated 31 March 2026. Data were collected through an online questionnaire with 26 questions up to 30 March. Purposive sampling with elements of snowball sampling was applied, and 121 valid responses were analysed.

Sample composition	Number	Share
Croatia	44	36,4%
Serbia	34	28,1%
Slovenia	30	24,8%
Other countries	13	10,7%
Total	121	100,0%

The three main countries account for 108 respondents; the total sample also includes 13 responses from other countries. According to the report, 84.3% of respondents work in basketball, 82.6% with children and young people, and 86% in urban areas. This is important for adapting the training and for caution when drawing conclusions about other sports and smaller communities.

Indicator	Average on a 1–5 scale
Self-assessment of digital skills	3,61
Readiness to introduce AI	3,80
Availability of digital tools	2,83
Perceived contribution of AI	2,95

The difference between average readiness and availability is 0.97 points. This is a descriptive difference between two indicators, not evidence of causation or effect size. Readiness to learn is not the same as demonstrated knowledge, and the expected contribution of AI is not measured athlete improvement.

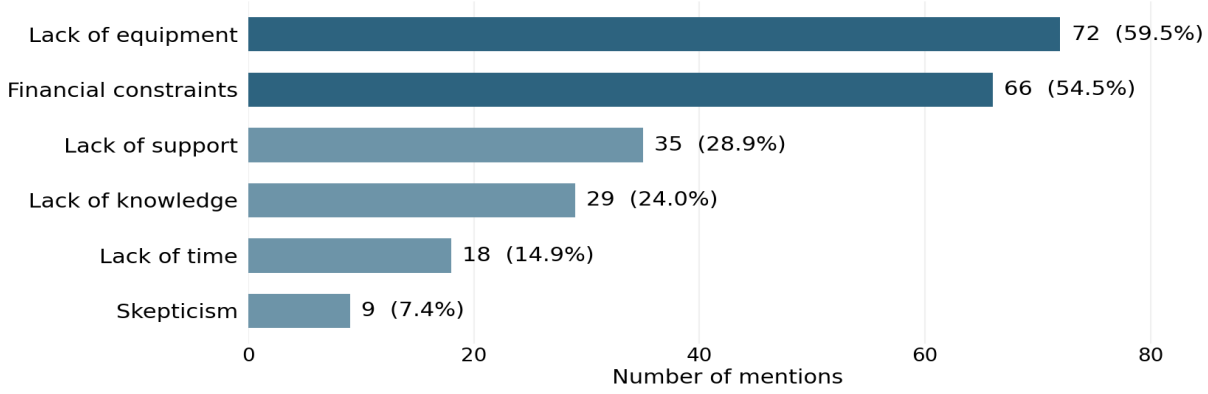
2.1. How to Use These Findings

The sample is not random, so the results should be interpreted as a description of the surveyed coaches. They do not represent an assessment of all coaches in Serbia, Croatia, Slovenia or the region. Differences between subgroups should not be described as statistically significant without appropriate analysis. A survey of attitudes and practices does not prove that technology improves results or prevents injuries.

For planning TechBall training, the findings support a practical direction: provide access to equipment, develop basic skills and practise data interpretation in particular. The success of this approach should subsequently be verified through work in clubs.

2.2. Barriers and Training Priorities

Equipment and finances are the most frequently cited barriers. Club support, knowledge and time also require an organizational response. The percentages below are calculated as the number of mentions divided by 121; the categories do not add up to 100%.



2.3. Requested Training Areas

Area	Number	Share of 121	Programme response
Basics of AI in sport	67	55,4%	Concepts, examples and verification of tool outputs.
Digital planning	54	44,6%	Shared records and work scheduling.
Use of sensors	49	40,5%	Device preparation and trial measurement.
Data interpretation	49	40,5%	Validity, comparison and justification of the decision.
Video analysis	46	38,0%	Labels, clips and feedback.

The report also records 73 mentions of international workshops. The proposal is to combine a practical workshop, short video instructions and support during the first application in the club. These numbers represent interest, not confirmed participation in future training.

2.4. Baseline Digital Practice

Video analysis is reported by 81 respondents (66.9%), training planning using applications by 42 (34.7%), AI tools by 14 (11.6%), and advanced sensors and GPS by 9 (7.4%). Training should therefore begin with a familiar task from video or record-keeping, then gradually introduce sensors and verification of automated outputs. The sensor and GPS category in the survey is not an inventory of the procured equipment.

2.5. Basic Concepts and Problem Selection

Concept	Meaning and example in basketball
Digitalization	Organized electronic records of training sessions, players and results.
Sensor-based measurement	Recording a physical signal, for example an optical signal associated with heart rate or the interruption of a light beam.
Data analysis	Comparison of times, average of attempts and display of changes. These procedures are not AI in themselves.
Video analysis	Review of technique and tactics using footage, labels and comments. It may be manual or partly automated.
Artificial intelligence	Systems that create predictions, recommendations or content from inputs. Each output is checked against the task.
Generative AI	Preparation of a draft text, image or other content; it may produce a convincing but incorrect answer.

2.6. Understanding the Problem Comes Before Selecting the Tool

Instead of the goal “introduce AI,” choose a task: reduce the time required to prepare a weekly report, consistently record jump results, or prepare three video examples of transition defence. For each task, state the baseline, the user of the result and the decision the result should support.

1. Ask the question: does the player perform the same task faster with the same number of correct responses?

2. Select the measure: time and number of errors in a predefined setup.

3. Standardize the procedure: the same arrangement, rules, warm-up, number of attempts and rest.

4. Define the next step: review performance, discuss it with the player and adjust the drill.

2.7. Measurement Does Not Replace Explanation

A slower time may be related to a different start, learning the task or a sensor error. A change in heart rate requires consideration of the training content and signal quality. Before drawing a conclusion, check the conditions and then the result. Distinguish a description of what happened from an assumption about its cause.

Participant task: write one question from your club, choose the simplest tool that can provide an answer, and state when you would not consider the result comparable.

3. What a Leader Should Know About Artificial Intelligence

A basic understanding of technology helps distinguish realistic capabilities from promises. Machine learning includes methods by which patterns are learned from data; deep learning uses multilayer neural networks. Computer vision processes images and video, while natural language processing deals with text and speech. These are related fields, but their presence in a product does not prove its accuracy for a particular task.

Autonomous systems can perform tasks with varying degrees of human supervision. A digital twin is a digital representation of a system linked to data about the real system. These concepts broaden the technological framework; they do not mean that the TechBall equipment procured is an autonomous system or a digital twin.

3.1. Eight Topics for Managers

Understanding generative AI. Generative systems create text, images, sound, code and other content based on inputs and learned patterns. A convincing answer may be incorrect, so the form of an answer is not evidence of quality.

Types and applications. Possible tasks include drafting a report, preparing workshop questions, summarizing a document and proposing communications. At the beginning, choose content that a competent person can check quickly.

Strategic impact. Assess which user benefits, which process changes and how success will be measured. Link the choice to the club's objectives, not merely to the novelty of the technology.

Human aspect. Discuss changes in roles, required skills and time for training. Involve employees in the trial and record the difficulties they encounter.

Ethics and responsibility. Define in advance who approves the data and verifies the output. Pay particular attention to content that may affect athletes' rights, health or opportunities.

User trust. Explain where the tool was used and what a person checked. Allow incorrect information to be corrected and maintain a trace back to the source data.

Technology framework. In addition to the model, orderly input, access arrangements, storage, result verification and support are needed. Record the version of the procedure and significant changes to the tool.

Implementation approach. Compare an existing service, cooperation with a partner and development of an in-house solution. For a small initial task, it is usually unnecessary to train your own model.

Task: choose one administrative example and state the input, expected output, the person who checks the answer and the condition under which the output is rejected.

4. Procured Equipment and Procurement Value

For practical TechBall work, the following equipment was procured under quotations from LARUS SPORT d.o.o. dated 31 August 2026 and addressed to the Rijeka City Basketball Association. The values in the table are the quotation amounts including VAT.

Quotation	Equipment and quantity	Purpose	EUR incl. VAT
2026-00398	Polar Verity Sense 10 sensors	Heart-rate monitoring.	918,00
2026-00399	WittySEM 1 kit with 6 units	Signal-response and direction-selection tasks.	4.940,63
2026-00400	Witty wireless timer 1 kit	Timing with appropriate sensors.	2.061,25
2026-00401	OptoJump Next 1 kit, 1 m	Analysis of jumps and temporal parameters of contact and flight.	3.130,13
Total	Four quotations		11.050,01

4.1. Link to the Research Findings

The procurement creates conditions for training in sensor use and data interpretation, areas each cited by 49 respondents. The equipment enables different types of tasks: heart rate describes a physiological response, WittySEM links a signal with action selection, Witty supports timing, and OptoJump supports jump analysis. These measures should be linked through session and player codes, with an explanation of each measure..

4.2. What the Inventory Means for the Training Plan

The two Witty kits each contain one timer, so the quotations include two timers in total. There are 18 tripods in total: six in the WittySEM kit, ten in the Witty kit and two with OptoJump. Two quotations include annual ProMove licences; the coordinator keeps separate records of activations and the scope of access.

For automatic sprint timing, first confirm that the complete photocell system is available. The reflectors in quotation 2026-00400 do not themselves generate a measuring signal. The session plan must correspond to the parts actually available and the active licences.

4.3. Kit Contents and Organization of Use

Kit	Contents according to the quotation
Polar Verity Sense N1	10 Polar Verity Sense sensors.
WittySEM N2	6 WittyPRO SEM light units; 1 WittyPRO Timing Device; 2 USB chargers; 7 cables; 6 tripods with heads, 425–1250 mm, load capacity up to 8 kg; 2 backpacks; Witty Manager; 1 annual ProMove licence for the kit.

Kit	Contents according to the quotation
Witty timer N3	1 WittyPRO Timer; 2 reflectors; 1 backpack; 10 tripods with heads, 425–1250 mm, load capacity up to 8 kg; 1 charger; 4 USB cables; annual ProMove licence.
OptoJump Next N4	1 TX and 1 RX bar with integrated interface; 1 bag; USB A+B cable; power supply; EU mains cable; power extension cable; 2 webcams; 2 tripods; 1 USB extension cable; OptoJump Next software.

4.4. Inventory for Operational Use

Each device receives an internal identifier and a serial-number record. The record includes the location, responsible person, accessories, condition, date of the last check and licence expiry. Count the devices at every handover and report any fault before the next session.

Responsibility	Task
Equipment coordinator	Inventory, charging, licences, schedule and contact with the supplier.
Station operator	Setup, trial, linking players and devices, and saving results.
Coach	Task selection, standardization, performance assessment and feedback.
Manager	Staff time, maintenance costs and the decision on whether to continue use.

4.5. Preparation Before the First Workshop

Compare the delivery with the documentation, activate the required software and check computer compatibility. For each station, conduct a trial from setup through reopening the saved result. Set an access schedule for clubs and designate a backup responsible person. Remove damaged parts from use.

A practical recommendation is to open a station only when it has a trained operator, a safe space and a functioning method of data storage. The number of available devices alone does not determine a safe number of simultaneous users.

5. Heart Rate and Response to Light Signals

5.1. Polar Verity Sense

Verity Sense is an optical heart-rate sensor. Place it on the upper arm or forearm so that the sensor rests against the skin, using a stable and comfortable armband. In recording mode, the sensor must be registered and linked to a Polar Flow account; after the session, the recording is synchronized for review.

Suggested task: monitor the same player during a repeated, predefined part of training. Record the player and sensor codes, the start and end of the drill, breaks and signal quality. For the next

comparison, keep the same work and rest durations. The coach explains changes in relation to the training content and observations of performance.

Ten sensors require verified linking of devices to ten players. If you plan a simultaneous team display, first check a compatible application and the scope of the licence. An individual account and ten devices do not automatically constitute a team system.

Heart rate does not directly measure distance covered, sprint speed or technical quality. Do not interpret a missing signal or a sudden signal spike as a reliable physiological event without verification. A higher heart rate in different players is not, by itself, a ranking of their fitness.

5.2. WittySEM

WittySEM displays colours and symbols for reaction, selection and movement tasks. The proximity sensor registers a gesture in front of the unit. The software and configured protocol determine the signal sequence and how results are recorded.

1. Position the units securely, outside collision paths. Mark the starting position and distances.

2. Explain one rule for responding to the signal and demonstrate how to activate the sensor.

3. Conduct a trial series, followed by a working series using the same rules for all participants.

4. Record time, correct responses, errors and deviations from the protocol.

Suggested progression: first perform the selection task without a ball, then perform the same task while dribbling. Treat these two versions as different protocols. Total time includes perception, decision-making and movement; do not call it pure reaction time when the player covers a distance.

5.3. Discussion Question

The player completed the task faster but responded to the wrong signal twice. Has the player improved? The answer requires a predefined criterion that considers both speed and accuracy.

6. Timing and Jump Analysis

6.1. Witty wireless timer

The timer receives timing impulses and supports the organization of tests. Appropriate photocells are used to register automatic passage through the start and finish. Before testing, check the devices, alignment and a trial pass.

Suggested protocol after confirming the photocells: sprint over a marked distance using the same starting position, sensor height, start rule, surface and deceleration area. The coach determines an appropriate warm-up, number of attempts and rest. Separate trial attempts from measured attempts in the records.

An additional hand movement that interrupts the beam, an incorrect starting position or an incomplete pass can change the result. Mark a technically invalid attempt and repeat it according to the protocol. Do not delete a correctly measured attempt merely because it is slower than expected.

6.2. One-Metre OptoJump Next Kit

OptoJump Next uses transmitting and receiving optical bars. It records temporal movement parameters, including contact and flight, while the software supports analysis and video review. Use the procured one-metre kit within a clearly defined testing area.

1. Position the bars parallel on a level surface, check the connection to the computer and the status of the optical system.

2. Select the jump protocol and explain hand position, take-off and landing technique.

3. Conduct a trial, followed by the predefined number of attempts.

4. Review the recording and video, mark invalid attempts and export the results with player codes.

Jump height derived from flight time is an estimated value and depends on assumptions about performance. A change in body position at take-off and landing affects comparison. OptoJump is not a force platform that directly measures force; with the one-metre kit, do not plan analysis over the full length of a sprint.

6.3. Interpreting Results

Fictitious example: the time for the same task decreased from 2.10 s to 2.04 s. The change is 0.06 s, or 2.86% of the initial value. Before drawing a conclusion, check the protocol and normal measurement variability. One faster time does not prove that a change in training caused the improvement.

7. Video Analysis in Basketball

In the research, video analysis is the most frequently cited digital tool, with 81 mentions. It is a good starting point for training because it allows the coach to connect a number with a visible action. Use the two webcams in the OptoJump kit primarily with its testing area; recording an entire game requires an appropriate field of view and system.

7.1. A Procedure a Coach Can Apply Immediately

1. Choose a question: transition defence, pick-and-roll defence or landing technique.

2. Position a stable camera outside the players' movement path. For technique, include the whole body and the floor; for tactics, ensure a view of the relevant space.

3. Record a trial and check lighting, obstruction and visibility of the key event.

4. Review at normal speed, then in slow motion, and mark the beginning and end of the action.

5. Prepare several short examples, including successful executions.

6. Agree with the players on one verifiable change and a task for the next training session.

Label	Definition for shared use
TR_ODBR	A situation after a change of possession in which defensive recovery and positioning are assessed.
BLOK	The agreed response to a screen, from the initial setup to the end of the action.

Label	Definition for shared use
ZAGR	A visible attempt to establish position relative to the opponent before the jump.
NEOC	The event is obstructed or out of frame; it is not assessed by guessing.

7.2. Veo as an Example of a Recording System

Veo enables automatic recording of play and work with video clips. In Veo Editor, the coach selects the event, label, players involved, comment and clip visibility. Functions and access depend on the model and subscription. A separate TechBall manual for Veo cameras is used for detailed steps.

According to the current documentation, Veo Analytics 2 supports football. For basketball, plan for footage review and manual tagging, without promising automatic statistics for points, assists or rebounds.

Suggested feedback: “In the footage, both players stay with the ball. Who picks up the player who is getting open? In the next training session, we repeat the same 3-on-3 situation.”

8. Specific Tools and Selection Criteria

The product name alone is not sufficient for selection. It is necessary to establish the task, the functions available in the specific package, the equipment required, the export method and total costs. The following examples are for orientation; Hudl, Dartfish, GPS and Kinovea are not procurement items in the four TechBall quotations.

Tool or category	Example use	What to check before selection
Hudl Sportscode	Customizable tagging and analysis of sports video.	Compatibility, recording method, operator training, licence and export.
Dartfish	Video analysis, event tagging and feedback.	Package, user collaboration, recording storage and practical workflow.
Kinovea	Free open-source tool for reviewing and annotating sports video.	Whether it suits the computer, recording quality and the local analysis task.
GPS / GNSS systems	A category of positioning systems; not the name of a single product.	For indoor use, require an explicitly confirmed solution and a trial under real conditions.
Applications and spreadsheets	Planning, record-keeping, scheduling and basic processing.	Access, version control, backup and export capability.

8.1. The Demo Should Resemble Real Work

Prepare a short example from training and agree on three actions the tool must enable: find an event, create a useful view and save or export the result. Have the future user conduct the trial, recording the time and assistance required. A supplier presentation is not a substitute for this check.

For video tools, ask whether tags and comments can remain available after the licence expires. For measurement systems, check whether an exported result is linked to the player, protocol and measurement time. For cloud services, check who manages accounts and how your own documentation can be downloaded.

8.2. Selecting According to the Problem

For reviewing one player's technique, a fixed recording and a slow-motion review tool may be sufficient. For systematic game analysis, an event dictionary, consistent tagging and sharing feedback are important. For physiological response, use an appropriate sensor and protocol. More features do not mean greater benefit if the team does not have time to use them.

Veo remains an example of a video system in this material. Its functions should be checked for the supplied model, subscription and basketball; it is not part of the confirmed inventory from the quotations..

9. Tool Selection and Organizational Readiness

The readiness assessment covers four areas: work culture, people, data and infrastructure. Answer each question with “yes,” “partly” or “no,” then assign a person and deadline for resolving the specific barrier.

Area	Assessment questions
Work culture	Is the objective clear to the coaches? Are errors from the trial recorded and used for learning?
People	Who sets up the equipment, who interprets the data and who takes over the work when the operator is absent?
Data	Are codes and protocols consistent? Can we find and explain an earlier result?
Infrastructure	Are the devices, computer, space, internet connection and licences sufficient for the selected task?

9.1. Selection Criteria

- Link to the objective: the tool provides the data needed for the decision.
- Feasibility: the team has the time, knowledge and space for regular use.
- Quality: the result can be verified and the conditions repeated.
- Access: data can be exported and handed over to an authorized person.
- Sustainability: maintenance, support and licence renewal have been planned.

9.2. Small Clubs and Larger Organizations

In a small club, the same person may handle several tasks, but every responsibility must have an owner. Start with one protocol and a shared equipment slot. A larger federation can provide a sharing schedule, centralized training and technical support. A more complex system makes sense only when the organization can maintain it.

In the research, coaches with 4–10 years of experience report digital skills of 3.94 out of 5, while the group with 21 or more years reports 3.33, with AI readiness of 3.67. These descriptive ratings support training adapted to prior knowledge. They should not be used to assume an individual's abilities or exclude more experienced coaches.

9.3. When to Postpone Implementation

If a tool has no clear purpose, if there is no person who checks the results, or if data cannot be saved and found, resolve those conditions first. A pilot can begin with simple record-keeping and an existing device, without developing an in-house AI model.

10. Four Pillars of Readiness: Culture and People

Consistent and sustainable use of technology requires development of four connected pillars: the culture of sports organizations, human resources, data and infrastructure. They serve as a practical planning framework. An organization does not need to reach the same level in all areas before starting, but it must resolve deficiencies that prevent safe and reliable use of the selected task.

10.1. Culture of Sports Clubs and Federations

Introducing artificial intelligence is still new for most sports organizations. Management must take proactive steps to shape employees' attitudes toward artificial intelligence. This includes a change in culture and mindset that can be achieved through the following approaches:

- Increasing AI literacy: all employees should understand the basic principles of artificial intelligence, know what their organization plans to do with AI and how this will affect their jobs.
- Preparing sports clubs and federations for experimentation and adaptation to uncertainty: the AI development cycle requires resources for multiple attempts and iterations.
- Forming cross-departmental teams: implementing artificial intelligence is a team task and requires cooperation among managers, coaches, employees, presidents and owners.
- Thinking broadly: for artificial intelligence to deliver real benefits, openness to new ideas and thinking outside existing frameworks is required.

In practice, this means that a manager approves time for training, accepts employees' questions and asks for explanations of results. An error in a trial record should trigger improvement of the procedure. Hiding an error to make the pilot appear successful prevents learning. The team should have room to experiment, but also clear limits on the use of real data.

10.2. Human Resources and Talent

In addition to a basic understanding of artificial intelligence, some employees must develop specialized skills. Without them, the ability to plan and implement an AI strategy will be limited. It is advisable to educate managers and coaches about the business aspects of artificial intelligence and development cycles before launching a pilot project. Sports clubs and federations can recruit new staff or upskill

existing staff, which may be more efficient because they already understand the internal infrastructure and processes.

The TechBall programme requires different, connected skills: the coach understands the sports task, the operator understands device setup, the data person understands record structure, and the manager understands the objective and cost. One person may hold several roles, but a backup and accessible instructions should be provided for every important action.

Training should not end with attendance at a presentation. The participant should demonstrate how to place a sensor, distinguish a trial from a valid attempt, find a saved result and explain a limitation. For more advanced tasks, plan targeted support rather than putting all employees through the same extensive technical course.

10.3. Team Agreement

At the outset, agree who proposes a change, who approves it, who conducts the trial and who monitors the result. The meeting after the first session should answer what worked, where time was lost and what should change before the next use.

11. Four Pillars of Readiness: Data and Infrastructure

11.1. Data Linked to Purpose

Analysis requires relevant, organized and verifiable data. The goal is not to collect everything the organization can collect. First establish the question and the minimum dataset needed to answer it. Then check where those data are located, who manages them and whether they can be linked without losing meaning.

Information may be distributed across spreadsheets, applications, email and paper archives. An inventory of sources is useful before consolidation. Transfer historical records only when they are relevant to a clearly defined purpose and the conditions under which they were created are known.An old result without a protocol label may not be comparable with a new measurement.

Using an already developed generative tool does not always require a large internal database or training your own model. For developing a model intended to predict events, requirements depend on the problem, sample quality and validation method. A small, inconsistent club dataset does not become a reliable basis merely because it is processed by a complex algorithm.

11.2. Infrastructure Supporting Day-to-Day Work

Appropriate infrastructure includes devices, software, a network where needed, storage space, backups and technical support. For an initial task, an existing computer and an organized folder with restricted access may be sufficient. For more complex shared use, system capacity, compatibility and responsibility for maintenance need to be checked.

For the procured equipment, first check the entire workflow: power and charging, connection, trial measurement, assignment of the player code, saving and reopening the record. If one step depends on a private device or the personal account of the only operator, the organization has a dependency point that should be resolved.

An external partner can help establish infrastructure, but cost and benefit should be assessed. The contracted work should include documentation, training and transfer of access. Consider what happens if the partner stops providing support or the club changes tools.

11.3. The Budget Follows the Four Pillars

The budget is not only the price of devices. It includes people's time, training, support, licences, maintenance and data organization. Instead of trying to improve everything at once, define three short-term steps: identify gaps, select a feasible initiative and prepare a short plan. Infrastructure development should follow actual use, not an assumed future need.

Task: for one measurement, draw the flow from the athlete to the final report. At each step, enter the responsible person, device or document and the verification method.

11.4. Readiness Assessment: Questions for the Team

The first short-term step is to establish the starting point. The assessment should be simple enough for the team to actually use it. The proposed form contains five questions for each pillar. It is a working tool for discussion, not a standardized scientific instrument or confirmation of compliance.

For each question, enter “yes,” “partly” or “no,” together with brief evidence. A “no” marks a gap, while “partly” indicates a need for improvement. Colours may help, but always retain a text label. Priority is determined not only by the number of deficiencies, but by their impact on the selected pilot.

11.5. Organizational Culture

1. Can management clearly describe the purpose of introducing the technology?
2. Do employees know what will change in their work?
3. Is there time and space for testing and reporting errors?
4. Do coaches, administration and management review the results together?
5. Has it been agreed who decides whether to continue, modify or stop the pilot?

11.6. People and Skills

1. Do we have a trained operator for every active device or station?
2. Does the coach understand the measure, protocol and limits of interpretation?
3. Does someone check the data and final reports?
4. Is there a person who can replace the key operator?
5. Is the training linked to a practical demonstration and support after the workshop?

11.7. How to Collect Evidence

Instead of answering “we have an expert,” record what action that person can perform independently. Instead of “we have management support,” enter the approved time slot, budget and person who makes decisions. Evidence may be a schedule, a training record, a trial measurement or a short adopted procedure.

Do not expect the first discussion to reveal every issue. New limitations will appear during work. Update the form after the first trial and at the end of the pilot; in this way the assessment becomes part of repeated improvement rather than a document completed only once.

12. Readiness Assessment: Data and Technical Conditions

12.1. Data

1. Do we know what data we have, for what purpose and where they are stored?
2. Do records contain a player code, date, unit and protocol label?
3. Can we quickly find the source data and check their quality?
4. Have access rights, retention periods and separation of identity from working tables been arranged?
5. Do we have a procedure for marking an error, correcting it and retaining an audit trail of the change?

12.2. Infrastructure

1. Does the kit for the selected task contain all required devices and accessories?
2. Are the computer, application and active licence compatible with the task?
3. Have we checked the entire workflow from setup to export of results?
4. Are there a backup, technical support and a procedure for equipment failure?
5. Do we know who manages accounts and how we retrieve data when changing tools?

12.3. Gap Register

Gap	Corrective action	Completion evidence
It is not clear which sensor the player used.	Introduce an assignment table and a pre-session check.	Trial records have the appropriate codes.
Only one operator knows the procedure.	Train a substitute and write short instructions.	The backup operator independently conducts the trial.
The photocell system has not been confirmed.	Check delivery and compatibility with the supplier.	A functional system has been confirmed and a trial completed successfully.
The export exists only on a personal computer.	Agree an approved storage location and access rights.	An authorized person can find the record and the backup.

For each measure, add an owner, deadline and cost. First resolve deficiencies that prevent valid measurement, data protection or reliable operation. Less important functions can wait. Keep the gap register open for new findings during the pilot.

13. Selecting Initiatives with the Greatest Practical Value

There are several ways to identify opportunities for applying artificial intelligence. Your team can use brainstorming to identify areas in the sports organization where its use would be most beneficial. Ideas may come from existing knowledge of sports administration or known inefficiencies in the sports organization.

A second approach is to analyse the sports organization's long-term goals and determine whether there are challenges that AI can address. You can also ask managers from different departments to define key challenges and then assess whether they can be solved or mitigated through the use of artificial intelligence.

Managers should understand the basic capabilities and limitations of AI so that they can formulate the need correctly. Examples from other organizations and discussions with external partners can broaden the list of ideas. Then translate each idea into a specific task: whom it helps, what input it uses, what it produces and who confirms the result.

13.1. Impact and Required Effort

Compare ideas according to expected benefit and the required investment of money, time and human resources. A simple workshop model can be used: an impact score from 1 to 10 and an ease-of-implementation score from 1 to 10, where a higher second score means less required effort. Multiplying the scores may help the discussion, but it is not a calculation of financial return or a validated measure of success.

Fictitious example initiative	Impact	Ease	Product
Unified testing record	8	8	64
Three tagged video examples per week	7	7	49
Verified AI draft report	6	6	36

The scores illustrate the procedure and are not a research result or a recommended ranking for every club. The team must justify its own scores and check prerequisites. An initiative lacking appropriate data or an acceptable method of use should not be selected simply because it has a high total or product.

13.2. Starting with One Initiative

How far you go with the list of ideas is up to you, but by the end of this step you should identify several initiatives with high potential. At the beginning, the number of initiatives is not decisive - what matters is starting with at least one.

If there is currently no problem for which AI provides a useful and verifiable solution, it is justified to focus effort on basic digitalization. Organizing records, developing skills and standardizing procedures remain useful. Revisit the search for an AI application when needs or capabilities change; there is no need to introduce it for the sake of the label itself.

Gap assessment and collection of initiatives can take place in parallel. Before adopting a short-term strategy, the two reviews should be connected: what we want to do and what we must first enable. The team's task is to select one initiative, state three prerequisites and one reason for postponing it.

14. Short-Term Strategy and Long-Term Goals

Once you identify feasible initiatives, prepare a plan that links their implementation with closing the gaps. The long-term vision provides direction, while the short-term strategy defines what the team does now, with which resources and how progress will be checked. The plan should fit your organization rather than become a general technology wish list.

The goal “become a club that uses AI” is not specific enough. A more useful goal describes the desired change in work: for example, that the coach receives verified results from a standardized session within an agreed time. Only then should you choose whether the process requires AI, a simple spreadsheet, a better schedule or a combination of tools.

14.1. Three Questions for Strategy

- Where do we see the greatest opportunity for technology to contribute to our work?
- Does that opportunity align with our long-term sporting and organizational goals?
- Which area do we focus on first, and why does it take priority?

Short-term steps serve long-term goals. Each implementation generates experience that should be used to adapt the next cycle. The plan therefore does not end with procurement or training, but with checking whether the process is actually used and whether it helps the people for whom it is intended.

14.2. Two Parallel Workstreams

There are two approaches to implementing the short-term strategy: developing use cases and proactively closing gaps. These two approaches can be carried out in parallel - it is only important to first close the gaps that are essential for development of the selected use cases.

The first track is development of a specific use case, such as a shared form for measurements and a summary for the coach. The second is enabling the organization: training a substitute, arranging access, activating the licence and establishing a backup. Some gaps are closed through the pilot, while others require a separate task and deadline.

14.3. Strategy on One Page

A short plan should contain the purpose, baseline, selected initiative, expected output, prerequisites, owners, deadlines, budget and continuation criteria. For example, an annual objective could be to introduce one demonstrably useful procedure and close 30% of the recorded gaps. This is an example of a planning objective, not an expected research result; the number of gaps is meaningful only together with an assessment of their importance.

After the pilot, document the experience and adopt the procedure that produced a useful result. Update the gap register and select the next small step. If the benefit is absent, change the problem, workflow or tool before making further investment. Progress is shown by reliable use and demonstrated practical benefit, not by the number of accounts opened.

15. Small Clubs and Large Federations

The size of the organization affects the distribution of roles and the choice of infrastructure. A small club can begin with one responsible coach, simple record-keeping and partner support. A larger club or federation must coordinate more teams, users and data sources. In both cases, a clear purpose, access arrangements, training and quality checks are required.

15.1. People and Culture

Introducing artificial intelligence is not possible without employee support. Sports clubs and federations should work to build a culture of openness, learning and trust in new technologies. It is essential to provide employees with training and empowerment and to communicate clearly how artificial intelligence will affect their roles, tasks and day-to-day work. Skills for the future include data literacy, critical thinking, working with digital tools and understanding the basic principles of artificial intelligence.

Area	Small club	Larger club or federation
Team	One person may hold several roles; provide a substitute.	Separate roles and a coordinator who connects departments.
Data	A single form and a limited number of sources.	Shared standards, access rules and control of data linkage.
Equipment	A sharing schedule and one well-supported task.	Capacity planning, maintenance and support for a larger number of users.
Training	Short practical training on the actual job.	Basic training for everyone and specialized programmes by role.
Assessment	A simple check of benefit and total cost.	Review by teams using shared indicator definitions.

15.2. Collaboration Instead of Duplicating Resources

A federation can organize a shared equipment schedule, mentoring and a collection of protocols that clubs adapt. Clubs can share experience about setup, training and errors without sharing players' personal data. Such cooperation is particularly useful when a device cannot be permanently available to every user.

A larger organization should not assume that more data automatically means better analysis. If teams use different protocols or labels, consolidation can create misleading comparisons. A small club, on the other hand, should not copy a complex structure it cannot maintain.

For TechBall, a practical model is gradual expansion: train operators, conduct trials in a limited number of sessions, document difficulties and only then increase the scope. Availability of devices, the number of trained people and processing time together determine sustainable capacity.

16. Process Improvement, Automation and Support for People

16.1. Organize the Process First

Before automation, check whether the process is clearly defined. Introducing technology provides an opportunity to remove unnecessary steps, duplicate entry and unclear approvals. Automating a poorly organized process canaccelerate the creation and spread of errors. Describe who initiates the task, which data are used, what is done and to whom the result is handed over.

16.2. Automation of Routine Tasks

Recurring tasks suitable for a trial may include compiling a report from a previously organized table or proposing a classification of documents. If the content requires natural-language interpretation, AI may help, but the expected time saving should be checked together with the time required for review. Many reminders, calculations and data transfers can be handled with ordinary automation without AI.

16.3. Augmenting Human Capabilities

Artificial intelligence does not have to merely replace human work; it can also enhance it. It can help analyse large quantities of data, suggest solutions, generate text and images, and even assist in creative processes. The key is collaboration between people and technology.

In coaching work, a tool may prepare a summary while the coach links the finding to the context of the drill and player behaviour. In administration, a tool may prepare a draft message while the responsible person checks facts, tone and recipients. It is important to separate content preparation from approval and action based on that content.

16.4. Example Workflow After Testing

1. The operator saves the source record and checks the session, player and protocol labels.

2. The data person marks missing or questionable values and prepares a verified table.

3. The coach records circumstances that may explain the finding and determines what should be compared.

4. If approved, a generative tool prepares a draft summary from the appropriate dataset.

5. The coach checks numbers and wording, approves the feedback and saves the final version.

16.5. Measuring Process Benefits

Compare the working time before and after the change, the number of corrections and whether another team member can repeat the procedure. If preparation becomes faster but checking becomes longer and more difficult, the overall benefit may disappear. Also record cases where it was faster or more reliable to complete the task manually.

Workshop task: select one existing job, remove an unnecessary step and only then propose what can be automated. State which action must remain under professional review.

16.6. Budget and Affordable Solutions

The equipment quotations total EUR 11,050.01 including VAT. For planning purposes, costs arising during use must also be added. Procurement value and the total programme cost are not the same measure.

Item	What should be planned
Initial procurement	Equipment, accessories, any additional sensors and a compatible computer.
Licences and access	Activation date, scope of users, duration and renewal price.
Staff time	Preparation, demonstration, testing, processing and meetings with players.
Maintenance	Cleaning, charging, transport, inspection of tripods and replacement of consumable parts.
Data and support	Storage space, backups, access management and operator support.

16.7. Starting with Existing Resources

For simple record-keeping, use a spreadsheet in software the club already has. An existing phone on a stable mount can be used for technical feedback if the trial recording suits the task. A shared calendar and equipment handover form enable several clubs to use the same kit without an additional purchase.

For AI training, prepare a fictitious table, request a draft report and check it manually. This develops critical reading without entering personal data. For video, start with a clear tagging dictionary and a short meeting with the players, and only then assess the need for paid features.

16.8. How to Check Economic Justification

Measure working time before and after implementation, the number of successfully completed sessions and the number of users. Calculate the cost per quality session by dividing the programme's total costs by the number of sessions that meet the agreed criteria. Describe benefits separately: better availability of materials, fewer lost records or faster preparation of feedback.

Do not derive expected return on investment from the readiness expressed in the survey. High interest may make it easier to begin, but it does not prove financial benefit. Make the decision to expand based on recorded work in your own organization.

16.9. Before a New Purchase

Request a demonstration using your own task, check data export and the total cost of use over two years. Contract training and support, and align the scope of delivery with the actual protocols the team will perform.

17. Data and Responsible Use of Artificial Intelligence

17.1. A Record That Can Be Verified

For each session, record the date, player code, device, protocol and version, attempt number, value with unit, validity status and note. Keep the source results and a separate working copy. A missing result is not zero, and a technical error remains marked in the records.

Player	Protocol	Attempt	Result	Status
TB01	SP10 v1	1	2,10 s	Valid
TB01	SP10 v1	2	Missing	Signal interruption
TB01	CMJ v1	1	31,2 cm	Valid

The table is a fictitious example. Before comparison, align testing conditions and the criterion for selecting attempts. If the protocol changes, create a new version. A shared session code links devices, but does not prove automatic time synchronization.

17.2. Example Task for a Generative AI Tool

“Based on this anonymous demonstration table, write a report for the coach of up to 150 words. State measured facts, do not fill in missing values, and separate possible explanations. Do not make diagnoses or predict injuries. Check the units and suggest two questions for the next session.”

The coach then checks every number, percentage and claim against the source record. Conclusions not supported by the data are removed. The report is approved by a named person; a convincing writing style is not evidence of accuracy.

17.3. Access Rules in the Club

- Define in advance the purpose of processing, authorized users and retention period.
- Use codes in working tables and keep the link to identity separately.
- For recording and sharing content involving youth categories, apply the organization's rules and check the required approvals.
- Enter personal and sensitive data only into tools approved by the organization for that purpose.
- Check that the backup can be opened and revoke a collaborator's access when their engagement ends.

Technology supports the assessment of the professional team. Decisions about health, fitness to play or return after injury should not be made on the basis of a single sensor, clip or response from a generative tool.

18. Data Preparation and Responsible Governance

The quality, availability and relevance of data affect the value of analysis. An organized dataset should correspond to the real context of use. If the meaning of a column, a unit or a measurement condition is missing, the analysis may appear precise while still leading to a wrong conclusion. Data preparation therefore precedes advanced modelling.

18.1. Four Practical Requirements

1. Organization and quality: agree column names, codes, units and permitted values.

2. Context: retain the protocol, date, conditions and important changes to the procedure.

3. Discrepancies: mark and investigate conflicting information; retain the original and an audit trail of the correction.

4. Sufficiency: include the data required for the task while avoiding unnecessary personal details.

A missing value is not zero. An unusual result is not automatically an error. Two different results may both be correct if they come from different protocols. Before merging tables, check identifiers, date format and units; after merging, check whether the number of records is as expected.

18.2. Existing Models and Synthetic Data

Organizations without data specialists can seek targeted external support. Pre-trained models may facilitate certain tasks, but they must be checked in the local context. Synthetic data are useful for demonstration and form testing; they do not replace quality checks on real, appropriate data. A publicly available dataset also requires verification of origin and terms of use.

18.3. Regulations Apply According to Context

The GDPR sets principles for processing personal data, including lawfulness, transparency, purpose limitation, data minimization, accuracy, storage limitation and security. For a specific processing activity, the legal basis and applicable obligations should be established; children's data and health data require particular attention.

The EU Data Governance Act (DGA) regulates specific mechanisms for data reuse and sharing, including data intermediation and data altruism. It is not a general obligation for every club that uses a spreadsheet. The EU Artificial Intelligence Act requires assessment of the organization's role and the intended purpose of the system. Obligations should be checked for the specific application and country; it should not be assumed that all regulations apply equally to all partners.

Organizational task: for each dataset, state the purpose, responsible person, access, storage location, retention period and correction procedure. Link this inventory to the record of tools used by the club.

19. Action Framework: Assessment and Priority Setting

Building the four pillars takes place through small steps and repetition. The following six steps connect the strategic part of the guide with day-to-day work. The steps provide a sequence for thinking; in practice, training, data organization and task selection often complement one another and take place in parallel.

19.1. Step 1: Assessment of Internal Capabilities

The first step in preparing sports clubs and federations for the introduction of artificial intelligence (AI) is to assess internal capabilities and the level of maturity. This assessment helps determine the starting point and plan the next steps. Introducing artificial intelligence into operations can be compared with a journey. To plan the route successfully, it is first necessary to know where we currently are: what is the present maturity of the sports organization in terms of its ability to introduce artificial intelligence? Sports

clubs and federations must be aware of their current state and internal capabilities so that development of AI capabilities is based on the initial level of maturity.

Use the readiness-assessment questions and talk to the people who actually do the work. Record existing equipment, skills, data, constraints and costs. If you involve a partner, ask for the assessment to be justified and for knowledge to be transferred so that the team can conduct the next review independently.

The output of the first step is a short overview of the starting point with a gap register. For TechBall, this includes inventory, operators, licence status, readiness for measurement, storage arrangements and available time slots. Procurement is an important resource, but it is not confirmation that the entire process is ready.

19.2. Step 2: Understanding AI and Setting Priorities

Introducing change requires an owner at management level. This person should understand the opportunities and risks and recognize the difference between a sporting objective and a technical solution. They do not need to be a data expert, but they must know who checks assumptions and who is responsible for the result.

Select management training according to the starting level and tasks. It is necessary to understand what the tool can do, where it fails, what it requires from data and how benefit is measured. Then apply the knowledge gained to selecting a use case with a clear user, baseline and estimated cost.

A sports organization must clearly define which business needs it wants to address through the use of artificial intelligence and prioritize use cases with clearly defined benefits and estimated implementation costs. Choosing initial AI use cases is not simple because it depends on factors specific to each organization. They need to align with the sports organization's overall vision for introducing AI technologies, as well as strategic decisions about where and for what purposes AI will be used - for example, process automation, decision-making, development of smart services and similar purposes.

Start with a simple case that can be verified. At the same time, develop employees' critical thinking, communication and collaboration. Use the experience of local clubs and suppliers as a source of questions, together with your own trial. The output of the second step is one selected initiative with a rationale and conditions for starting.

20. Action Framework: Skills and Data

20.1. Step 3: Developing Skills and Professional Networks

Professional associations, universities, sports federations and digital-development centres can be sources of training, consultation and contacts. Assess their programmes according to content, availability and experience with similar organizations. Membership or attendance at an event is meaningful when it leads to knowledge the team can apply.

To begin, choose one specific need: reliable device setup, video tagging, spreadsheet processing or checking an AI response. Agree a practical training outcome and a method of support after the workshop. Learning is easier to verify when it ends with a completed task and an available example of the procedure.

A partner network can also help later with more complex issues of data linkage or software development. The club should retain understanding of the objective and responsibility for decisions

even when the technical component is performed by a partner. Do not make a day-to-day process dependent on help whose scope and availability have not been agreed.

20.2. Step 4: Preparing Data for the Selected Solution

Define the data required for the initiative, then check their origin, quality and usability. Create a small trial dataset and go through the entire processing workflow. Increase the scope only after a successful trial. Resolve empty fields, incorrect units and inconsistent labels before preparing an automated report.

In the TechBall programme, a shared session code can link a heart-rate record, a response-task result, a jump and a video. This linkage does not mean that the systems exchange data automatically. Identity, time and the purpose of comparison must be checked. Different measures describe different aspects of the task and should not be reduced to a single score without a justified methodology.

Step result	Evidence of practical competence
Skills development plan	Each role has a training task, time slot, mentor and verification method.
Support network	A known contact person and an agreed scope of assistance.
Organized trial dataset	Labels, units, conditions and missing values checked.
Data agreement	Purpose, access, storage and responsibility established.

Participant task: have another authorized person find the saved result without additional verbal explanation. If that person cannot reliably determine to whom and to which protocol the record belongs, improve the record-keeping.

21. Action Framework: Internal Team and Partnerships

21.1. Step 5: Employee Development and External Expertise

After the foundations are in place, people with appropriate knowledge of the task, devices and data are needed. A small club does not need to employ every specialist profile. It can develop existing people and involve experts for precisely defined tasks. The decision depends on how frequently the task occurs, its complexity, the budget and the need to retain knowledge within the organization.

Sports organizations can develop internal resources or rely on external partners. The decision depends on the size of the organization and its strategy. Each role must have an individual training plan. Expert assistance is recommended in defining these pathways, because a list of courses alone is not sufficient.

Role	Knowledge and practical verification
Management	Understands the objective, cost, risk and criteria for the decision to continue.
Coach and operator	Independently carry out the protocol and explain the limitation of the result.

Role	Knowledge and practical verification
Data-responsible person	Checks quality, access, storage and the audit trail of corrections.
Technical partner	Resolves the agreed problem and transfers documentation and knowledge.

21.2. Step 6: Managing Costs Through Collaboration

Partnership can contribute expertise and resource sharing, but it is not in itself a guarantee of lower costs. Before making a decision, compare internal implementation, a partner service and shared support for several clubs. Include preparation, training, maintenance, licences and staff time. Require a clear description of the deliverables and how they will be verified.

- Which task and result does the partner take over, and what remains the club's responsibility?
- What experience does the partner have in a similar sporting and organizational environment?
- How are functionality, accuracy and practical usability verified?
- Who manages accounts, documentation and data export?
- What does support include and what are the terms for ending the cooperation?

A good outcome of collaboration is a process that the team understands and can maintain with the agreed level of support. After the initial pilot, assess whether support can be reduced, whether additional training is needed and whether the next investment is justified. The decision should be based on documented use, not only on a product demonstration.

22. Practical Training Programme

The proposed programme consists of four 60-minute learning blocks, for a total of 240 minutes of work, with breaks added by the organizer to the schedule. The content corresponds to the priorities identified in the research: AI basics, planning, sensors, interpretation and video analysis.

Block	Content	Evidence of competence
1 • Basics and planning	Concepts, problem selection, codes, protocol and assessment of club readiness.	The participant formulates a question and selects a measure they can explain.
2 • Sensors and signals	Polar Verity Sense and WittySEM; linking to the player, trial and task rules.	The participant prepares the device, conducts a trial and finds the record.
3 • Timing and jumps	Witty with a confirmed photocell system and OptoJump; validity and comparison of attempts.	The participant identifies an invalid attempt and states the reason.
4 • Video and report	Three tagged video examples, brief data interpretation and review of an AI draft report.	The participant distinguishes fact from assumption and proposes the next task.

22.1. Workshop Organization

Adjust the number of groups to the number of trained operators. Each active station has supervision, a clear movement path and one-page instructions. First demonstrate the task, then allow a trial and independent execution. Rotate the roles of operator, player and recorder during the work.

22.2. Learning After the Workshop

During the following two weeks, each participant conducts one small session in the club and submits an example of a properly saved record, a brief interpretation and a description of a problem. A mentor provides feedback. Short video instructions should show one procedure at a time: preparation, trial, saving or resolving a common error.

22.3. Checking Understanding

1. Explain why a heart-rate sensor is not a GPS device.
2. State two reasons why the task time may not be comparable with the previous test.
3. Explain why a faster response with more errors does not necessarily mean improvement.
4. Show how you find the source result and how you verify a claim from an AI report.

The practical assessment is completed successfully when the participant independently prepares one station, conducts a trial, saves the result and explains its limitation. Self-assessment is recorded additionally, but it does not replace demonstration.

23. Action Plan and Success Review

The proposed eight-week pilot leads from assessment of existing capabilities to a decision on continuation. Adopt the deadlines and objectives before the start and adjust them to the available people and time slots.

Period	Activity	Responsible person	Completion evidence
Week 1	Inventory, licences, access and selection of one question.	Coordinator and coach	Complete kit for the selected task and protocol card.
Week 2	Training and trial session.	Mentor and operator	Independent execution and retrieval of the saved result.
Week 3	Initial implementation in the club.	Coach	Record of conditions, working time and record quality.
Weeks 4–6	Regular sessions and brief consultations.	Operator and coach	Weekly log, problems and selected examples of feedback.
Week 7	Repeated use of the same protocol.	Coach	Comparison with verification of methodological comparability.

Period	Activity	Responsible person	Completion evidence
Week 8	Assessment of benefit, cost and continuation.	Manager	A reasoned decision with responsibilities for the next period.

24. Success Indicators

- Share of operators who successfully demonstrate the procedure relative to the number trained.
- Share of usable records relative to the total number of attempts, with reasons for rejection.
- Number of completed sessions and clubs using the equipment.
- Time from the end of the session to delivery of verified feedback.
- Number of coaching decisions supported by a documented finding and subsequent verification.

25. First-Use Card

Club question: _____
Tool and protocol: _____
Responsible person and time slot: _____
Baseline and objective: _____
Validity criterion and verification method: _____
Costs, support and data access: _____

The final discussion should answer three questions: was the team able to use the tool regularly, were the data of sufficient quality, and did the process help the work? A favourable answer supports continuation; problems should guide changes to the protocol, training or organization.

26. Timeline and Process Repetition

The eight-week pilot represents an initial cycle, while organizational development continues through multiple cycles. There is no need to promise in advance a timeframe within which AI will deliver benefit. Timing depends on the starting point, the selected task and the team's ability to use the procedure regularly. The plan below is a proposal to be adapted.

Phase	Main task	Condition for the next step
Before pilot preparation	Management training, problem selection and review of the four pillars.	Agreed objective, owner and baseline.
Immediately before the pilot	Operator training, trial data, equipment and access.	Successful trial of the entire procedure.
During the pilot	Regular implementation, log of difficulties and support.	A sufficient number of quality records to assess the procedure.
After the pilot	Assessment of benefit and cost; decision on continuation.	Reasoned continuation, modification or termination.

Phase	Main task	Condition for the next step
Regular implementation	Documentation, operator backup and monitoring of changes.	The process is sustainable and repeatable.

26.1. Proposed Annual Cycle

In the first quarter, complete the assessment, training and first pilot. In the second, consolidate the process that demonstrated benefit and close the most important gaps. In the third, consider including an additional team or another simple task. In the fourth, review costs, licences, quality and needs for the following year. This schedule is illustrative and should be adapted to the sporting season.

26.2. Monitoring and Adaptation

During implementation of the strategy, some gaps close while new ones become visible. Therefore repeat the assessment at the end of each cycle. The number of activities is not a sufficient indicator of progress; check who actually uses the process, the quality of the data and which decision the finding supported.

For each new version of the procedure, record what changed and from which date it applies. If the device, software or testing rule changes, re-check the workflow and comparability of results. Turn pilot experience into short, accessible instructions and an example of a well-completed record.

The pilot should enable learning and verification of added value. The initial result does not have to be perfect, but it must be reliable enough to explain the next decision. Management ensures continuity, while coaches and operators demonstrate what technology means in everyday practice.

APPENDIX – TechBall Equipment User Manual

(Practical Guide for Basketball Coaches and Operators)

Project: Integration of Smart Technologies into Basketball Training

Project acronym: TechBall

Partner: Serbian E-sports Federation

Date: 01 September 2026

Subject: Analysis of the Technological Readiness and Needs of Sports Coaches

Scope: Serbia, Croatia and Slovenia

Author: Jovan Vujošević and Dalibor Marinović





Disclaimer / Statement

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

How to Use This Manual

Begin by checking the inventory and completing the shared preparation steps. Then open the chapter for the device you are using. After each session, verify player identity, retain the original results and complete the equipment log. The procedures in the drill chapters are proposed TechBall protocols; the coach adapts them to the age and experience of the group.

The operating instructions are based on the manufacturers' official documentation. Menu names may differ between versions of Witty and WittyPRO devices. During initial setup, check the model designation and the corresponding manual; carry out electrical connection and servicing in accordance with the instructions for the supplied device.

1. Procurement Overview and Critical Checks

Quotation	Main item	Quantity	EUR incl. VAT
2026-00398	Polar Verity Sense	10	918,00
2026-00399	WittySEM kit with 6 units and timer	1 kit	4.940,63
2026-00400	Witty wireless timer kit	1 kit	2.061,25
2026-00401	KIT 1m OJ Next 1 cm	1 kit	3.130,13
Total			11.050,01

Supplier: LARUS SPORT d.o.o., Zagreb. Buyer stated in the quotations: Rijeka City Basketball Association. All quotations are dated 31 August 2026. The total net amount after discount is EUR 8,840.00, and the total stated VAT is EUR 2,210.01. Rounding of individual quotations produces the displayed total.

1.1. Mandatory Checks upon Handover

- Photocells: request confirmation from the supplier of the quantity and model. The two reflectors listed in quotation 00400 do not prove that photocells were supplied.
- Timers: quotations 00399 and 00400 each list one timing device. Record both serial numbers and their intended use.
- Tripods: the total listed quantity is 18, of which 10 are in quotation 00400. Compare this with the delivery note, without making any arbitrary quantity corrections.
- ProMove: both Witty quotations list an annual licence. Confirm the number of usage rights, the associated kits, and the activation and renewal dates. Do not assume that this means two years for a single account.
- Polar: the quotation lists the sensors without itemising accessories. Check the armbands, holders and USB charging adapters.
- A computer, phone or tablet, and a team system for simultaneously displaying ten heart-rate readings are not explicitly listed as purchased items. Check availability and compatibility.

Label the received equipment with internal codes. The quotation records do not replace the delivery/handover record; the actual purchased inventory must be confirmed by a physical count and handover documents.

2. Inventory of Components by Quotation

Quotation	Item listed in quotation	Quantity
00398	Polar Verity Sense	10
00399	WittyPRO Sem traffic light	6
00399	WittyPRO Timing Device	1
00399	USB charger / cable for Witty and accessories	2 / 7
00399	Tripod with head, 425–1250 mm, up to 8 kg	6
00399	Witty backpack / Witty Manager software	2 / 1
00399	ProMove annual licence for the kit	1
00400	WittyPRO Timer / Witty Reflector	1 / 2
00400	Witty backpack / tripod with head	1 / 10
00400	Charger / USB cable for Witty and accessories	1 / 4
00400	Witty ProMove annual licence	1
00401	OptoJump Next TX / RX with interface	1 / 1
00401	Bag for the 1-metre kit	1
00401	USB A+B cable / USB extension cable	1 / 1
00401	Power supply / EU mains cable / power extension cable	1 / 1 / 1
00401	Webcam / tripod with head	2 / 2
00401	OptoJump Next software	1

The abbreviated numbers in the table refer to quotations 2026-00398 through 2026-00401. Equipment names are aligned with the quotations; a slash separates distinct items and their corresponding quantities.

2.1. Proposed Labelling System

Polar: P01–P10. Light units: SEM-A to SEM-F. Timers: T01 and T02. OptoJump: OJ-TX and OJ-RX. Cameras: K01 and K02. Label cables with the code of the kit they belong to without covering factory markings or openings.

For each device, record the model, serial number, internal code, associated accessories, condition and storage location. Check accessory quantities before leaving the sports hall as well.

3. Preparing the Space and Session

3.1. Before the Group Arrives

1. Select one objective and one protocol. Confirm that you have all required components, sufficient space and a trained operator.

2. Charge the devices, check the licences and open a test record. Install updates outside training sessions and verify operation afterwards.

3. Place the equipment on a stable, level surface. Mark the active zone, waiting area and exit direction. Cables and tripod legs must remain outside the movement path.

4. Prepare a list of player codes and a session code, for example TB_20261005_U16_01. Check the date and time on all devices.

5. Check the signal from each sensor and save a short test. Do not begin group testing if you cannot locate the test result.

3.2. Working with Players

Explain the task and demonstrate the correct technique. The coach confirms that the participant is ready for the activity and leads an appropriate warm-up for the group. Practice attempts must precede measured attempts. Only one player may be on the active movement path; the others wait outside the measurement zone.

Stop the task in the event of pain, dizziness, significant discomfort, loss of movement control or a collision risk. Follow the club's emergency plan. The devices do not replace assessment by a qualified healthcare professional.

3.3. Comparison Rules

For repeated measurements, keep the same station order, warm-up, footwear, surface, rest periods and instructions. Record any deviations, prior activity and technical problems. When players have not used the equipment before, use the first measurement to familiarise them with the procedure.

3.4. After Completion

Stop and save every recording, count the devices, review the results and make a backup copy. Clean and dry the equipment before packing it away. Separate faulty equipment from working equipment and record the fault in the log together with the name of the responsible person.

4. Polar Initial Setup and Live Operation

Polar Verity Sense is an optical heart-rate sensor. For the basketball programme, use live heart-rate display or recording to the sensor's internal memory. Swimming mode is not intended for this use. Technical procedures in this chapter: P1–P3.







4.1. Initial Setup

1. Charge the sensor using its USB adapter. The contacts must be clean and dry.

2. On a compatible phone, open Polar Flow and the approved user account. Enable Bluetooth and internet access for setup.

3. Switch on only the sensor you are currently connecting. Start pairing from within the Flow app, not only from the phone's Bluetooth settings.

4. Confirm the sensor identifier, complete the app instructions and record the player to whom the sensor is assigned. Check for available updates before regular use.

4.2. Wearing the Sensor on the Arm

Place the sensor in its armband holder firmly against the skin of the forearm or upper arm, not on the wrist. The optical surface must be in contact with the skin. The armband should prevent movement without causing uncomfortable tightness. Check comfort during trial movement and ensure that the device does not create a risk during contact. [P2]

Live Monitoring

1. Switch on the sensor with a short press. Heart-rate mode is indicated by the heart symbol and a blue status light on the side. Wait until all six LEDs light up.

2. In the connected app or on a compatible watch, verify that the heart rate displayed belongs to the correct player. If you want to save a record, start recording on that receiving device.

3. Monitor signal stability during use. At the end, stop recording in the app or on the watch, check the record and switch off the sensor by holding the button until the lights go out. [P3]

Suggested operator check: record one minute of standing still and one minute of light movement, then locate both segments in the record. This checks the procedure and identity assignment; it is not a medical accuracy test.

5. Polar Recording and Working with Ten Sensors

5.1. Recording Without a Phone During Training

1. Before the first recording, register the sensor and link it to a Polar Flow account.

2. Switch on the sensor. Immediately use short presses to select the arrow symbol; the side status light is green.

3. Wait until all six LEDs light up, position the sensor and begin the activity.

4. When finished, hold the button until the lights go out. Open Flow and wait for synchronisation; verify the date, duration and ownership of the record.

5. A recording from internal memory is listed as Other indoor; change the sport profile in the Flow app if necessary. [P4]

5.2. Organising the P01 to P10 Sensor Set

For each session, maintain a sensor–player–account–mode table. During the pilot phase, it is preferable to keep sensors assigned consistently to reduce the risk of mixing data. Do not link all ten sensors to one personal profile on the assumption that Flow will automatically distinguish ten players.

Simultaneous team display requires a separately verified compatible solution, a receiving device and the appropriate usage rights. Purchasing ten sensors alone does not confirm that team software has also been purchased. Before working with a group, demonstrate reception and correct separation of all ten signals.

Problem	Operator procedure
No heart-rate reading	Check power, skin contact, mode and the correct ID in the app.
Irregular or intermittent recording	Check for armband movement and connection issues; mark the segment and do not fill it with invented values.
No saved training session	Check whether internal memory was used or recording was started on the receiver; then check synchronisation and the account.
Record belongs to another player	Exclude it from analysis until the records have been checked. Document any correction.

Use heart-rate data together with a description of the activity and the player's subjective feedback. Do not set the same heart-rate threshold for everyone, nor define zones for underage athletes solely by using a general age-based formula. Training limits are determined by the responsible professional team.

6. WittySEM Preparation and Connection

Six WittyPRO SEM units display illuminated symbols and colours. The proximity sensor detects approach, so the device should not be struck. The kit enables reaction and choice tasks with or without movement. [M1]













6.1. Setting Up the Station

1. Position six stable tripods outside the path of players' feet and the ball. Adjust the height to the task and participants, and record it.

2. Switch on the units and the selected timer or compatible ProMove app. For initial operation, use only one control system.

3. Check the SEM-A to SEM-F identifiers, the radio settings when operating with the timer, and the number of units in the test. Run a unit search if that function is available.

4. Set the proximity threshold to suit the task and test it by hand on each unit. The threshold is not a fixed distance in centimetres and depends on the environment.

5. Select a short test sequence. Verify that the intended signal illuminates and that each unit registers a response. Save the configuration and record the number and layout of the devices. [M2]

6.2. Selecting the Control Method

ProMove is intended for compatible WittyPro devices via Bluetooth and supports customised tests. First activate the usage right associated with the supplied kit and verify in the app that all required units have been found. Do not automatically apply the ProMove procedure to older-generation Witty equipment. [M3]

The Witty Kit manual describes operation with the timer and SEM settings. If the number of detected devices does not match the test or identifiers are duplicated, resolve the problem before starting. Do not run two adjacent tasks using the same units without first verifying independent control.

6.3. What Is Measured

In a task that requires running to a light, the total time includes perception, choice, initiation, movement and sensor activation. Refer to it as task completion time. Changing the distance or proximity threshold changes the difficulty and comparability of the results.

7. WittySEM Basketball Drills

The following drills are TechBall training proposals, not manufacturer-standardised tests. Begin slowly and accurately, then increase the demands. Adjust the number of attempts and rest periods to the group; identify every change with a new protocol version.

7.1. SEM 01 Stationary Signal Selection

Setup: three units in a shallow arc, reachable without stepping across the tripods. Record the spacing and height. Task: the player activates only the agreed target by hand, for example a specific colour or symbol. Perform five practice signals, followed by two sets of ten with 60 seconds of rest. Where the software allows it, include no-go signals; otherwise, the coach records errors separately.

Record: configuration, number of correct responses, missed or incorrect responses, and the time displayed by the app. Do not add arbitrary penalty seconds to the result. For players who have difficulty distinguishing colours, use symbols or another available contrast option.

7.2. SEM 02 Lateral Movement and Stopping Control

Setup: two units to the left and right of the starting marker, suggested at 2 m from the centre on each side, with clear space for deceleration. Task: on the signal, the player moves to the target, activates the sensor and returns to the centre. Trigger the next signal only when the player is ready again, if the selected mode allows this; otherwise, use a pre-tested pause.

Familiarisation volume: two sets of six responses, with 90 seconds of rest. Record accuracy, set time and technical notes. Invalid attempt: leaving the agreed path, failing to return, or activating the wrong unit.

7.3. SEM 03 Dribbling and Choice Reaction

Once the previous task has been mastered, the player repeats it while dribbling. The player controls the ball with one hand and activates the signal with the other without striking the unit. Start with two units and add more only if space and control allow. Record loss of ball control and selection of the wrong target separately.

Do not compare the result with the no-ball task as though they were the same test. Use video for feedback on body position and control, not for automatic ranking of basketball talent.

8. Witty Timer and Sprint Measurement

This chapter applies only when compatible photocells and their corresponding reflectors are available. If they have not been supplied, postpone the automated sprint test and use the verified functions of the other stations. A reflector does not independently emit a timing impulse.

8.1. Preparing the Timing Gates

1. Measure the start and finish with a tape measure. For the proposed TB-SP10 protocol, the distance between the planes of the timing gates is 10 m.

2. Position a photocell and reflector opposite each other on each line, at the same recorded height. Align them according to the indicator on the supplied model.

3. Switch on the timer and check the signal from each gate. On the classic Witty interface, select the Sprint Start-Stop test or the corresponding test with one start and one finish. Check the equivalent on the WittyPRO version.

4. Make a trial pass through the start and then the finish. Confirm that the first event starts and the second ends the measurement. Prevent unintended crossings through the zone. [M2, M4]

8.2. TB SP10 Proposed 10 m Test

The player adopts the same position 0.5 m behind the start plane, without rocking in a way that breaks the beam. The player starts independently when the operator is ready, passes through both gates and decelerates in a pre-secured zone. The timer measures the interval between beam breaks; the initial movement to the first gate is not included.

After the warm-up and one trial run, perform three valid attempts with approximately two minutes of rest, or longer at the coach's discretion. Save all attempts and report the best time for this protocol. Use the same result-selection rule in repeat testing.

Invalid: beam triggered too early, another person in the gate, moved tripod, incorrect path or lost impulse. Repeat only after a rest period and record the reason. Do not break the beam by hand to artificially improve the result.

An additional timing gate is required to obtain 5 m and 10 m results simultaneously. The two reflectors listed in the quotation are not sufficient evidence that equipment for three timing lines is available. Label manually started timing as manual and keep it separate.

9. Witty Data Storage and Troubleshooting

9.1. Transfer via Witty Manager Software

1. In the software, prepare a player list with unique numbers and the test definitions. Before sending them to the timer, check that there are no duplicates.

2. Connect the timer to the computer using a USB cable and verify that the software recognises it. Transfer the selected start list and tests if required.

3. After measurement, download the tests from the timer to the computer. In the Results section, check the number of attempts and confirm that each player number is linked to the correct person.

4. Save the database and export the results in an available format. Do not delete data from the timer before verifying the copy. [M5]

For ProMove, use the save and export procedure for the installed version. Verify that the record remains available after the app is closed and that the planned synchronisation has completed. An export from the app and a backup of the entire database are not necessarily the same thing.

Symptom	Check and procedure
No start or finish	Check the power supply, alignment, signal and the role of the gate in the test. Repeat the trial by walking through the gates.
More events than expected	Remove other players and objects from the path. Check the test definition; do not change filters blindly.
SEM unit does not respond	Check the battery, ID, number of units and control system. Test the unit individually.
SEM responds too early	Check the proximity threshold, surrounding objects and the position of other participants. Repeat the check for all units.
Result linked to the wrong number	Check the start list and log; correct the entry with a note while preserving the original source record.
Computer does not recognise the timer	Check the USB data cable, port and manufacturer-specified driver; close any other program using the device.

If the same fault remains after the basic checks, stop using that station. Provide the supplier with the model, serial number, software version, test description and error message. Do not open the housing or change service settings while working with players.

10. OptoJump Setup and Trial Test

The kit contains one 1 m TX transmitting bar and one 1 m RX receiving bar, software, two cameras and accessories. The bars register interruptions of the optical beams, from which the system determines timing parameters. Jump height is a derived value rather than a directly measured height. [M6, M8]

10.1. Connection

1. Install the official OptoJump Next software and the required drivers on a compatible computer. Check the requirements of the current version before selecting the computer.

2. Place the TX and RX bars parallel to each other, with their optical sides facing one another, on a level surface. Choose a spacing sufficient for a controlled jump and within the manufacturer's limits; record the distance.

3. Connect the USB cable from the RX bar to the computer. Switch on both bars and use the supplied power source in accordance with the instructions. Align the bars until the status indicates a correct connection.

4. Connect the cameras. In Utility > Basic Settings > Video, select an available camera, check the image and save the settings. Names and appearance may differ between versions.

5. Open Utility > OptoJump Hw Test, run Execute and verify beam-break detection by entering the measurement area. With the area empty, check that no sensors are unexpectedly obstructed. Finish the test. [M7]

10.2. Before the First Jump

Position the cameras outside the landing area, one from the side and the other from another useful angle. Ensure that the feet and contact with the floor are visible. Route cables along the edge of the area. The player must enter and leave without stepping on the bars.

In the software, select the player code and the appropriate test. Perform one controlled trial jump, finish and save the test, then open the result and video. Do not continue if the record is missing or if contact and flight have clearly been registered incorrectly.

Do not accept automatic disabling of obstructed optical elements merely to remove an error message. First remove the obstruction and check alignment. Filtering is an advanced setting that changes the measurement conditions and must be documented.

11. OptoJump Jump Protocols

The proposed protocols are intended for a trained coach and participants who can control their landing. Adjust the number of attempts and rest periods to the participants' experience. Do not introduce drop jumps or demanding single-leg series merely because the software offers them.






OptoJump
by MICROGATE

11.1. OJ CMJ Countermovement Jump

Setup: the player stands still between the bars with hands on hips. The player performs a quick, controlled countermovement followed immediately by a vertical take-off. The hands remain on the hips; the knees are not drawn up in flight to prolong landing time. The landing is controlled and remains within the same measurement zone.

Procedure: one or two practice attempts, followed by three measured attempts with approximately 60 seconds of rest. For the initial TechBall protocol, save all valid attempts and report the greatest height. Use the same selection criterion in repeat testing.

Invalid: leaving the zone, moving the hands from the hips, touching a bar, unusual leg tucking, or a technical interruption. Record the reason and allow a repeat after rest, without forcing a fatigued player.

11.2. OJ SJ Jump from a Held Position

With hands on hips, the player assumes a pre-agreed half-squat position, holds it for approximately two seconds, then jumps without an additional downward movement. Use the video to verify whether a countermovement occurred. Perform three valid attempts with the same rest period as in the previous test. Record CMJ and SJ as separate protocols.

11.3. Reading the Results

TFlight denotes flight time, TCont contact time, and Elevation the calculated height. Height estimation uses the relationship $h = g \times t^2 / 8$, where t is in seconds, g is approximately 9.81 m/s², and h is in metres. Differences in body position at take-off and landing may affect the estimate. [M8]

Where an appropriate repeated or reactive jump is used, RSI is calculated as height in metres divided by contact time in seconds. Do not interpret contact before a standalone CMJ attempt as standard RSI. The 1-metre kit does not automatically provide all the capabilities of a longer modular or 2D system. [M8]

12. Results and Consolidated Report

12.1. One Row per Attempt

In the consolidated record, retain the player code, session, device, protocol and version, attempt, result, unit, validity and note. Keep original exports separate from processed tables. Link video using the same attempt identifier.

Session	Player	Protocol	Attempt	Result	Status
DEMO01	TB01	SP10 v1	1	2,10 s	Valid
DEMO01	TB01	SP10 v1	2	—	Signal interruption
DEMO01	TB01	CMJ v1	1	31,2 cm	Valid

The table is a fictitious example of the structure. The symbol “—” means that the result is missing; it does not mean zero. An invalid attempt remains in the record with the reason stated and is excluded from sporting comparison.

12.2. Brief Report for the Coach

1. State the question and conditions: what was assessed and whether the protocol remained unchanged.

2. Present the valid results and the pre-selected summary measure, for example the best of three times.

3. Add data-quality information: signal interruptions, number of invalid attempts and changes to the setup.

4. Separate fact from interpretation and state the next step that the coach can verify.

A shared session does not mean automatic synchronisation across systems. Link Polar, Witty and OptoJump records using identifiers and the time log. Do not overlay time series unless start times and device clocks have been verified.

12.3. Access Protection

Share results only with authorised persons. Participants should receive understandable feedback, not a public ranking of heart rates or health assumptions. The responsible person determines in advance the purpose, legal basis and retention period. For minors, apply the organisation's established procedure. [Z1]

Suggested folder structure: date and group, followed by Original, Processing, Video and Report. File name: session_player_protocol_attempt. Verify the copy by opening a selected result; an export confirmation message alone is not sufficient verification of the content.

13. Maintenance and Checklists

13.1. Polar After Each Use

Rinse the sensor with lukewarm water, using mild soap if necessary, then dry it with a soft towel. Do not use alcohol, abrasives or disinfectants prohibited by the manufacturer. Remove the armband from the sensor and wash it according to the label; leave it to dry. The contacts must be completely dry before charging. [P5]

13.2. Witty and OptoJump

Switch off the devices before packing. Remove dust from optical surfaces with a soft cloth and follow the instructions for the specific model; do not apply the Polar rinsing procedure to other electronics. Inspect connectors, cables, mounts and tripods. Isolate and report any damaged component.

13.3. Pre-Use Checklist

- The inventory is complete for the selected task; photocells have been confirmed if sprint timing is being used.
- Batteries, accounts and licences have been checked; the computer and devices recognise the equipment.
- The space, cables, tripods and deceleration zone have been checked.
- Players, codes and devices are correctly linked; instructions and practice attempts have been completed.
- The test result has been saved and reopened.

13.4. Post-Use Checklist

- All recordings have been stopped; results and identities have been checked.
- Invalid attempts have been marked; exports and a backup copy have been saved.
- The equipment has been counted, cleaned, dried and stored safely.
- Faults and setting changes have been recorded; the next session and responsible person have been entered.

13.5. Periodic Inspection

Each month, the coordinator checks accessories, battery condition, access rights, licences and the ability to restore data. Before changing software, save the database, record the current version and repeat the test after updating. Plan renewal of annual licences according to the actual activation date, not the quotation date.

14. Forms for Practical Work

14.1. Session Record

Date and time _____ Location _____
Group _____ Operator _____
Session code _____ Protocol and version _____
Conditions and deviations _____

Player	Device	Attempt	Value and unit	Valid	Note

14.2. Handover and Service

Date _____ Handed over by _____ Received by _____

Code and serial number	Accessories and quantity	Condition or fault	Action and deadline

14.3. Protocol Card

Name and version _____
Objective and target group _____
Setup and distances _____
Devices and settings _____
Warm-up and practice attempts _____
Number of attempts and rest _____
Validity criterion _____
Summary measure and unit _____
Approved by coach _____ Date _____

Copy the forms for each session. Do not enter diagnoses or other unnecessary sensitive data in the shared equipment log.

15. Documentation and Final Training

15.1. Technical Sources

P1 Polar Verity Sense general setup and user manual

P2 Polar sensor placement on the body

P3 Polar live heart-rate mode

P4 Polar internal-memory recording mode

P5 Polar maintenance and cleaning

M1 Microgate WittyPro SEM description and support

M2 Witty Kit user manual, especially sections 4 and 5

M3 Microgate ProMove description and download

M4 Witty quick installation guide

M5 Witty Manager manual, especially sections 3 and 4

M6 Microgate OptoJump Next description and support

M7 OptoJump Next quick installation guide

M8 OptoJump Next manual, especially section 5.1.2

Z1 European Commission information on the processing of personal data

Sources checked on 29 September 2026. Inventory and amounts: LARUS SPORT quotations 2026-00398 through 2026-00401 dated 31 August 2026. Retain the manuals supplied with the models actually delivered.

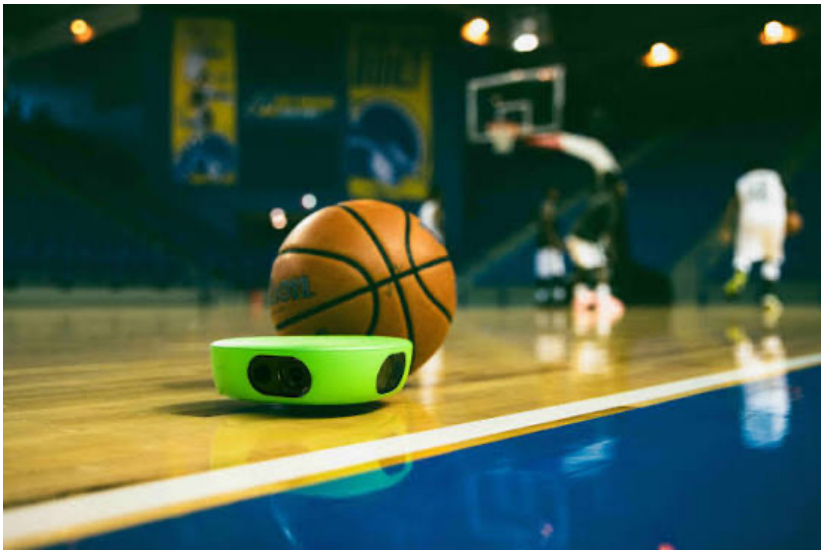
15.2. Practical Competency Assessment

The operator independently prepares one station, explains the task, identifies a deliberately introduced technical problem, carries out a trial and locates the saved result. Training is complete when the operator can repeat the procedure and explain the limits of interpretation. The equipment coordinator confirms the demonstration.

16. Recording and Video Analysis in Basketball Using Veo Cameras







16.1. Models, Applications and Initial Access

Feature	Cam 2	Cam 3	Cam 3 5G
4K / 30 fps recording	Yes	Yes	Yes
Wi-Fi connectivity	Yes	Yes	Yes
Built-in cellular connectivity	4G	None	4G and 5G

Feature	Cam 2	Cam 3	Cam 3 5G
Live streaming	With the Veo Live add-on	With the Veo Live add-on	With the Veo Live add-on

The standard Veo Cam 3 does not have SIM functionality. It can use Wi-Fi for internet access, including a suitable phone hotspot. The camera's internet connection and the phone's Bluetooth connection to the camera serve different purposes. [V1, V4]

Tool	Purpose
Veo Cam App	Phone or tablet: connection to the camera, frame preview, recording and device status.
Clubhouse / Veo Editor	At app.veo.co: team organisation, review and analysis of uploaded recordings.
Veo app	Viewing live streams and content; formerly called Veo Live. It is different from the camera-control app.

16.2. Initial Activation

1. Open the invitation or activation message, create a password and sign in at app.veo.co. The administrator checks the club, team and active plan.

2. Install the Veo Cam App. Sign in with the same account; enable Bluetooth and the requested connection permissions. Ensure the phone has internet access.

3. Switch on the camera, connect to it in the app and select the appropriate Clubhouse when the registration request appears. Registration is completed by the Clubhouse administrator, provided that a camera slot is available in the plan.

4. Check the club name before confirming: registration activates the subscription and links the camera to the Clubhouse for 30 days.

5. Make a short test recording, upload it and open it in the account before the first game.

Record the camera model and ID, the administrator, subscription expiry date and the person responsible for charging. Do not share one common password among all staff. Account and registration procedure: [V2, V3]; apps: [V5, V6].

16.3. Indoor Setup

16.3.1. Choosing the Position

For standard recording, first test an elevated position near the midpoint of the sideline with the entire court visible. Veo's general guidance specifies a distance of 3–5 m from the sideline; indoors, adapt the

position to the available space while keeping passageways clear and maintaining a safe zone around the tripod. [V7]

Veo's basketball guide also describes an elevated corner position for viewing transition play and the full game. Before the game, test both possible positions and keep the one with clear court lines, both baskets visible and the least obstruction. Use a view from behind one basket only for supplementary technical analysis, because it does not cover the far end of the court. [V8]

16.3.2. Mounting and Stability

1. Place the tripod on a flat, firm surface outside the path of players and spectators. Use the setup and stabilisation method specified for the particular tripod model.

2. With the tripod lowered, spread and lock the legs. On the Veo carbon-fibre tripod, check the position of the braces and the tightness of the locks.

3. Check that the quick-release mount is correctly attached. Insert the camera plate according to the mount instructions and verify that the lever has locked the camera before releasing your hold.

4. Raise the sections gradually, checking each lock as you go. Protect your fingers and keep the equipment under supervision.

5. Open the frame preview. Check both end lines, all four corners and both baskets, as well as the area immediately outside the boundary lines.

Do not move a raised tripod with the camera mounted. Lower it before changing position. Stakes and external guy lines described in tripod instructions are not suitable for a sports-hall floor; use an approved indoor stabilisation method. [V9, V10]

16.3.3. Quick Frame Test

Check that nets, barriers, passers-by or the basket structure do not obstruct the action. Avoid direct glare into the lens. The test recording should include movement to both baskets. Start recording the game only when the camera is in its final position; do not move it afterwards. [V7, V8]

16.4. Connection and Recording

16.4.1. Controlling the Camera by Phone

1. Enable Bluetooth and Wi-Fi on the phone. In the Veo Cam App, sign in with an account belonging to the camera's Clubhouse.

2. Press the camera power button for approximately one second and wait for the light indicator to show that the camera is ready.

3. Select the correct ID from the list of detected cameras. In Camera settings, check the battery, available storage and firmware version.

4. Tap Preview. If prompted by the app, connect the phone to the camera's temporary Wi-Fi network to view the frame.

The Wi-Fi network broadcast by the camera is used for local preview; it does not itself provide the camera with internet access. The camera's connection to the venue network is configured separately. [V4]

16.4.2. Starting and Stopping Recording

1. Once the frame has been checked and the tripod secured, press Record. Verify in the app that recording is active.

2. The camera then records independently; the phone does not need to remain next to it. The operator periodically checks the security of the tripod.

3. At the end of the event, reopen the app and stop the recording.

4. Enter the event name and details, then save the recording. Locate it in Library / On Camera.

5. Create a new recording for the next game. Do not record an entire tournament as one unnecessarily long file.

The recording remains on the camera until it is uploaded. Instant Playback becomes available after approximately the first 45 seconds of recording; use it only if the operator can continue to supervise the equipment safely at the same time. [V11]

16.4.3. Naming Convention

2026-10-05_U18_ClubA-ClubB_game
2026-10-07_U16_training_screen_defence

If you had to stop and restart recording, add part_01 and part_02 and enter the reason in the record. Plan to start before the opening tip-off and finish after the final play. If lighting changes significantly, the official guidance recommends starting a new recording. [V7]

16.5. Uploading Recordings and Checking Processing

16.5.1. Connect the Camera to the Internet

1. In the app, open Camera settings → Connection → WiFi connection. Select the network, enter the password and verify that Camera Connection displays WiFi.

2. Use a network that does not require browser login or acceptance of terms; such captive portals are not supported.

3. If you use Cam 2 or Cam 3 5G, follow Veo's recommendation to remove the SIM before uploading over Wi-Fi. Remove the SIM only when the camera is switched off.

4. An Ethernet connection via a compatible USB-C adapter is an alternative. The adapter and network cable are not included by default.

Network setup: [V12]. Upload method and SIM recommendation: [V13]; SIM-card handling: [V20].

16.5.2. Track Two Separate Steps

Step	What to check
1. Upload	Library → On Camera shows progress. The first two lights flash during upload and stop flashing when the upload is complete.
2. Platform processing	Open the event in Clubhouse. Wait until the recording is ready to view and check playback.

After a successful upload, the recording is automatically deleted from the camera's memory. The camera is therefore not an additional backup of an already uploaded recording. If you start a new recording during upload, the upload pauses temporarily and resumes later. [V13]

16.5.3. Check Before Closing the Task

- Open the correct event and check the name, team and date.
- Check the beginning, a section from the middle, and the end of the game.
- If there is an interruption, record it in the log and inform the coach.
- Download any selected clips for which the club wants an additional copy and verify that the files open correctly.
- Determine who is authorised to view the recording and who should receive feedback.

Upload time depends on the recording duration and the network's actual upload speed. A completed upload does not mean that processing is complete. If uploading does not start, first check that the recording has a title. [V14]

16.6. Video Analysis and Clips

16.6.1. Select the View

Open the recording in Veo Editor at app.veo.co. Follow Cam automatically follows the play. Interactive Mode allows manual control of the view, which is useful when reviewing players away from the immediate action. [V15]

16.6.2. Create a Clip

1. Locate the event on the timeline. Select + and then New Clip / Create Clip, or use the H shortcut.

2. Select an existing tag or create your own, for example “Transition defence”.

3. Adjust the duration using the handles on the timeline. In Follow Cam view, the initial duration is 30 seconds and can be extended up to 3 minutes.

4. Tag the team and the players involved; add a brief comment.

5. Check the clip visibility, then press Save. Open the saved clip and verify its start and end points.

Tagged players and members mentioned with @ receive an email notification. Add tags only when the comment is ready for them. Edit your own clip via ⋮ → Edit; download an individual clip via Download. [V15]

16.6.3. Feedback That Leads to a Drill

Example: “When coming off the screen, both defenders stay with the ball and the player popping out is left open. Which coverage are we using in this situation? At the next practice we will repeat 3-on-3 with the same entry.”

Keep the context: the action before an error often explains the outcome. First show the recording without commentary and ask the player what they see. Then identify one action they can change. Do not overwhelm the team with dozens of similar clips.

16.6.4. Limits of Automated Analytics

According to the current Veo guidance, Veo Analytics 2 supports football and requires the relevant add-on. For basketball, do not assume automatic statistics for points, assists, rebounds, speed or distance covered. This basketball manual uses video review, manual tagging and coach verification. [V16]

16.7. Practical Application in Basketball

The following tasks are suggestions for coaches, not automatic camera functions. For each session, choose one question and define in advance what you will count or describe.

Topic and tag	What to observe	Training task
Transition • TR_DEF	Who stops the ball first, who protects the rim, and how do the other players position themselves after a change of possession?	3-on-2 followed by a 2-on-1 return, with a clear agreement on the first defensive responsibility.
Screen defence • SCREEN	Player positioning before contact, communication, and the agreed switch or method of getting through the screen.	3-on-3 with the same starting setup and one pre-selected rule.
Rebounding • BOX	Does the player establish contact and position relative to the opponent before going for the ball?	Controlled shoot–box out–rebound task; review two successful and two unsuccessful examples.
Turnover • TO	Defensive pressure, available passing lanes and the player's decision before the turnover.	Small-sided play in a reduced space with clearly defined help options.
Offensive spacing • SPACE	Teammate positioning at the moment of penetration and the availability of passing options.	4-on-4 with agreed movement rules during penetration.

16.7.1. 20-Minute Meeting

3 min: remind the team of one principle. 8 min: review four selected clips, including successful examples. 5 min: players describe alternative decisions. 4 min: agree on one task and one review criterion for the next practice.

16.7.2. Comparable Records

If you count occurrences, record the definition and the total number of observed opportunities. Example: “successful box out in 8 of 12 clearly visible opportunities”. Mark obstructed situations as not assessable. Do not fill them in by assumption and do not draw a conclusion about the whole game from selected clips alone.

Two coaches can independently tag the same five plays. If their assessments differ, first align the definition and then continue the analysis. Video assessment supports discussion and planning; the quality of the judgement depends on event visibility and consistency of the criteria.

16.8. Live Streaming

Veo states that this function is optimised for football and that the best results in other sports are not guaranteed. Test a basketball live stream in the same venue before the event. [V17]

16.8.1. Requirements and Start-Up

A registered supported camera, the Veo Live add-on and a stable internet connection are required. The official minimum upload speed is 5 Mbps. Cam 2 and Cam 3 5G can use an active nano-SIM card without a PIN; the standard Cam 3 uses Wi-Fi. [V17]

1. Check the camera's internet connection and open Go Live in the Veo Cam App.

2. Enter the event details and select Veo Live as the destination.

3. Check court detection. If AI needs assistance is displayed, select Manual input and adjust the corners according to the app instructions.

4. Confirm the start. Do not move the camera after selecting the corners.

5. Check the stream in the Veo app on another device; the delay is approximately 60 seconds.

6. To finish, select Stop Livestreaming and confirm. Enter the details and save the recording; then complete the usual upload for analysis.

Procedure flow: [V17]. During the live stream, do not leave the phone unnecessarily connected to the camera's local Wi-Fi preview network, as this may affect stream quality. [V4]

16.8.2. Test Before the First Live Stream

- Check the event's visibility settings and who will have access to the stream before pressing Go Live.
- Test the network from the camera position under conditions similar to the game. A full phone signal alone does not prove sufficient upload capacity.
- Check the frame in both halves of the court and the tracking behaviour during a fast break.
- Assign one person to monitor the viewer-facing stream and another to supervise the equipment.
- Agree on what to do if the live stream is interrupted: first check the status of the local recording so that material remains available for later analysis.

Streaming to YouTube requires additional destination linking and the live-streaming function to have been enabled on that account in advance; initial approval may take up to 24 hours. Use the dedicated official instructions [V18]. Treat stream keys as confidential access credentials.

16.9. Troubleshooting and Maintenance

Problem	Check sequence
Camera does not appear	Check power, Bluetooth and app permissions. Move closer to the camera, verify the ID and reopen the app. [V19]
No access rights or registration	Check that you are in the correct Clubhouse and that the administrator has a valid plan with an available camera slot. [V3]
Connected, but no preview	Open Preview and accept the connection to the camera's local Wi-Fi network. This is not the internet-network setup. [V4]
Upload does not start	Add a title to the recording, check registration, the camera's internet connection and a network without a captive portal. Check the SIM and try another network or Ethernet. [V12–V14]

Problem	Check sequence
Upload is slow	Check upload speed and network load. On a school or club network, involve IT support; do not change security rules blindly. [V14]
Frame follows the wrong action	Check for obstructions, lighting, line visibility and additional balls or players outside the game. Do not rotate the camera during a recording. [V7]
Camera does not respond	When no important recording is active, try restarting the camera by holding the button for about 15 seconds. This Cam 2/3 restart does not delete saved recordings. [V19]

16.9.1. Operator Routine

Before leaving, check the housing, lenses, mount, tripod locks, cable and charger. Clean the lenses with a suitable soft cloth. Charge the camera in advance; Veo recommends at least four hours of charging as preparation. Check the actual battery level in the app and the duration of the planned event. [V7]

After use, lower the tripod before removing the camera. Pack the equipment so that the lenses and mount do not strike other components. If the connector is wet or damaged, postpone charging and contact support. Do not open the housing for self-repair.

When reporting a problem, prepare the model and ID, app and firmware versions, time of the error, recording name and a photo of the message. Check status.veo.co and contact support.veo.com. Do not send passwords or stream keys.

16.10. Checklist and Record Keeping

Use this page for every game. The operator checks off completed items and informs the coach about the availability of the recording.

Stage	Confirmation
Before departure	☐ Camera and phone charged ☐ Free storage ☐ Account and plan checked ☐ Tripod, mount and cables
Setup	☐ Stable tripod ☐ Mount locked ☐ Passageways clear ☐ Entire court and both baskets visible ☐ Test frame
Recording	☐ Correct camera selected ☐ Record confirmed ☐ Operator assigned ☐ Camera position remains unchanged
Completion	☐ Recording stopped ☐ Title and details saved ☐ Recording visible on camera ☐ Equipment inspected

Stage	Confirmation
Handover to coach	☐ Upload and processing completed ☐ Playback checked ☐ Access configured ☐ Coach knows where to find the recording

16.11. Event Record

Field	Entry
Date / venue	
Teams / category	
Camera model and ID	
Operator / contact	
Recording name	
Start and end / interruptions	
Upload and processing checked	
Observed problem / next step	