Measurement System – Implementation Notes

Overview
This project implements an interactive 3D measurement tool designed to integrate into an ECS-based Three.js engine.
The system enables users to measure distances in world space using a two-click workflow, providing live visual feedback
and finalized engineering-style dimension annotations.

Interaction Flow
• Activate measurement mode to begin measuring
• First click sets the start point
• Mouse movement shows a dashed preview line
• Second click completes the measurement
• Escape cancels an in-progress measurement
• Multiple completed measurements can coexist

Visual & Engineering Standards
• Dimension lines are rendered as solid offset lines
• Extension lines include a small gap from measured points and overshoot past the dimension line
• Arrow terminators are filled inward-facing triangles
• Distance text is formatted to two decimal places with unit suffix and a readable background

Text Placement Logic
• 0–30°: text is horizontal and centered above the line
• 30–60°: text rotates to follow the line angle
• 60–90°: text remains horizontal and is positioned to the side for readability

World-Space Measurement
Distance calculations use full 3D world coordinates. For local validation, mouse input is raycast onto a reference plane.
In production, world positions would be obtained via mesh raycasting without changes to system logic.

Architecture & Memory
• Materials are reused to reduce memory overhead
• Each measurement is grouped for clean scene management
• Cleanup hooks are designed to integrate with the host engine lifecycle

Conclusion
The system provides accurate world-space measurement, visually correct engineering annotations, and clean system isolation
suitable for integration into a larger Three.js-based application.