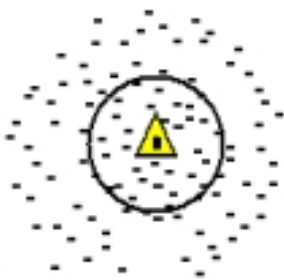
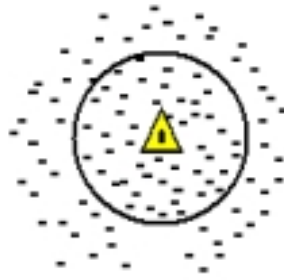


# Accuracy Definitions

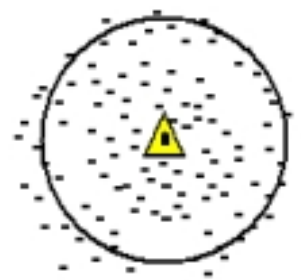
---



CEP  
50%



RMS  
63-68%



2D RMS  
95%



**Accuracy specifications can be expressed in many ways**

## **Circular Error of Probability (CEP)**

CEP is based on a 50% confidence level. If 100 positions are collected at one point, 50% of

them will be within the stated accuracy and 50% will be outside the stated accuracy.

### **Root Mean Square (RMS) error**

RMS error is based on a 63 - 68% confidence level. If 100 positions are collected at one point, 63 - 68 of them will be within the stated accuracy, and 32 - 37 will be outside the stated accuracy.

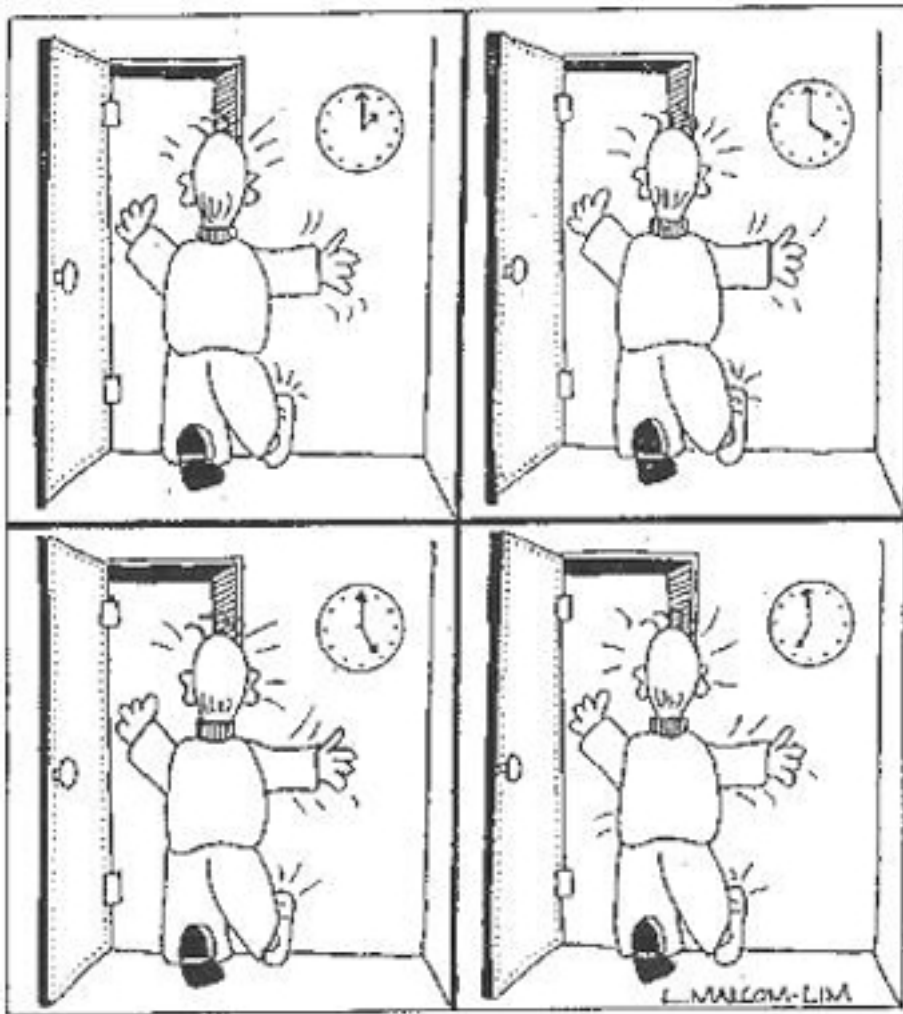
### **2D Root Mean Square (2D RMS) error**

Two Degree Root Mean Square (2D RMS) error is based on a 95% confidence level. If 100 positions are collected at one point, 95 of the positions will be within the stated accuracy, and 5 will be outside the stated accuracy.

### **Vertical accuracy**

Depending on the geometry of the satellite constellation, the vertical accuracy of any GPS position may be from sub-meter to 3 times larger than the horizontal accuracy. The vertical component is difficult to calculate because SVs have a limited perspective in which to measure height. If the receiver could use signals from underneath it, the vertical component could be accurately measured, but the Earth blocks these signals.

## Accuracy versus precision



DESPITE MUCH PRACTICE,  
ERNEST COULD BE PRECISE, BUT  
NOT ACCURATE

**Accuracy** describes how closely the calculated value compares to the known value. **Precision** is the measure of repeatability.

