Potential Enhancements to the Human Interface

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What is the Human Interface

- The method by which radiation measurements, operational status and analysis is conveyed to users
- Adding a microprocessor package and software between the detection system and the user can provide new methods for operations, analysis and communications
- Think in terms of a feature that guides users and adds more measurement capability

Hardware Implementation

- This capability could be mounted in a traditional CAM cabinet with A/C power, networked unit, or it could be a battery powered “blind” unit that attached to an air sampler and operated through a remote computer.

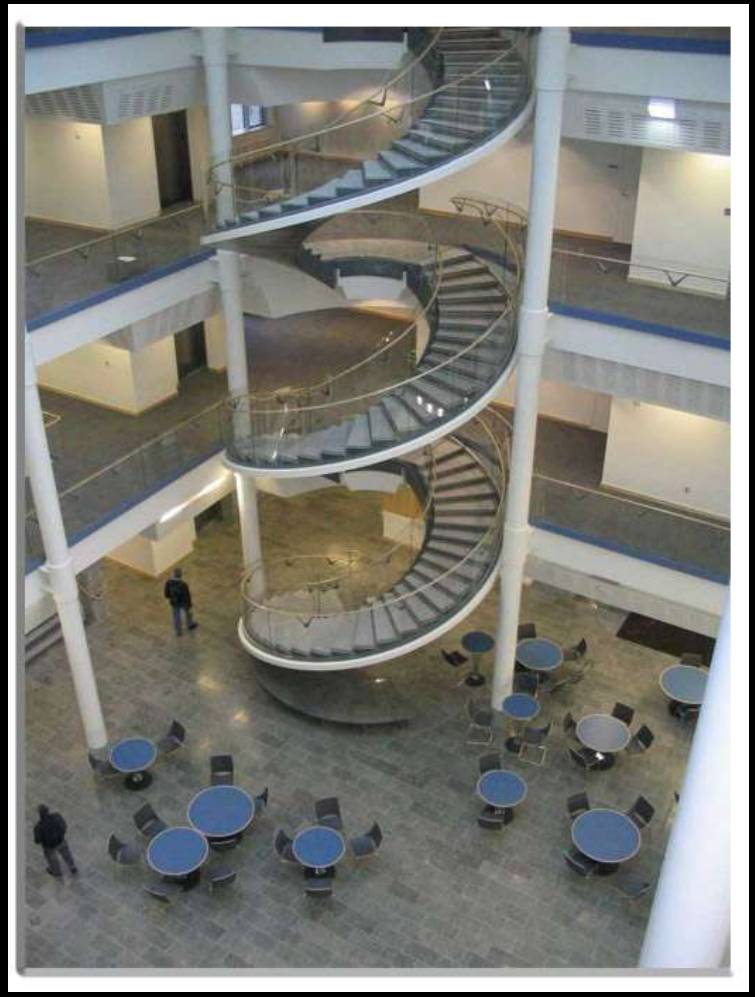
Simple Operational Controls

- Select from a library of efficiencies
  - Different buildings in a lab, areas within a building
- Preselected list of alarm levels
  - Environmental, RCA, respiratory protection
- Adjust count periods
  - Adjust count time according to background rate
- Calculate time to alarm (airborne stay time)
- Automatic verification of alerts or alarms

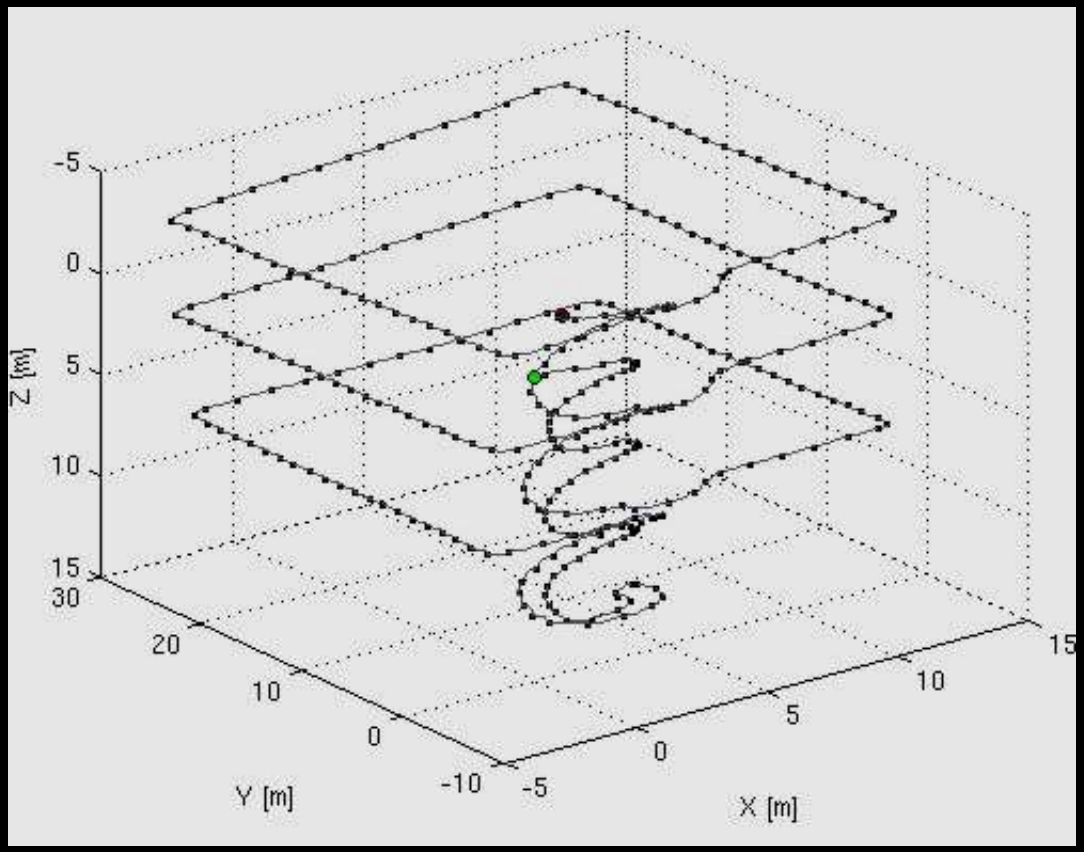
Automatic Location Measurement

- Location measurement could be built in
  - GPS is nearly universal in outdoor applications
  - WiFi nodes can also be used for location
  - Cell phone nodes can be triangulated
  - Custom laser/RF beacons
  - Inertial Guidance
- Location movement alarm
  - LoJack for CAMs

Inertial Location Example

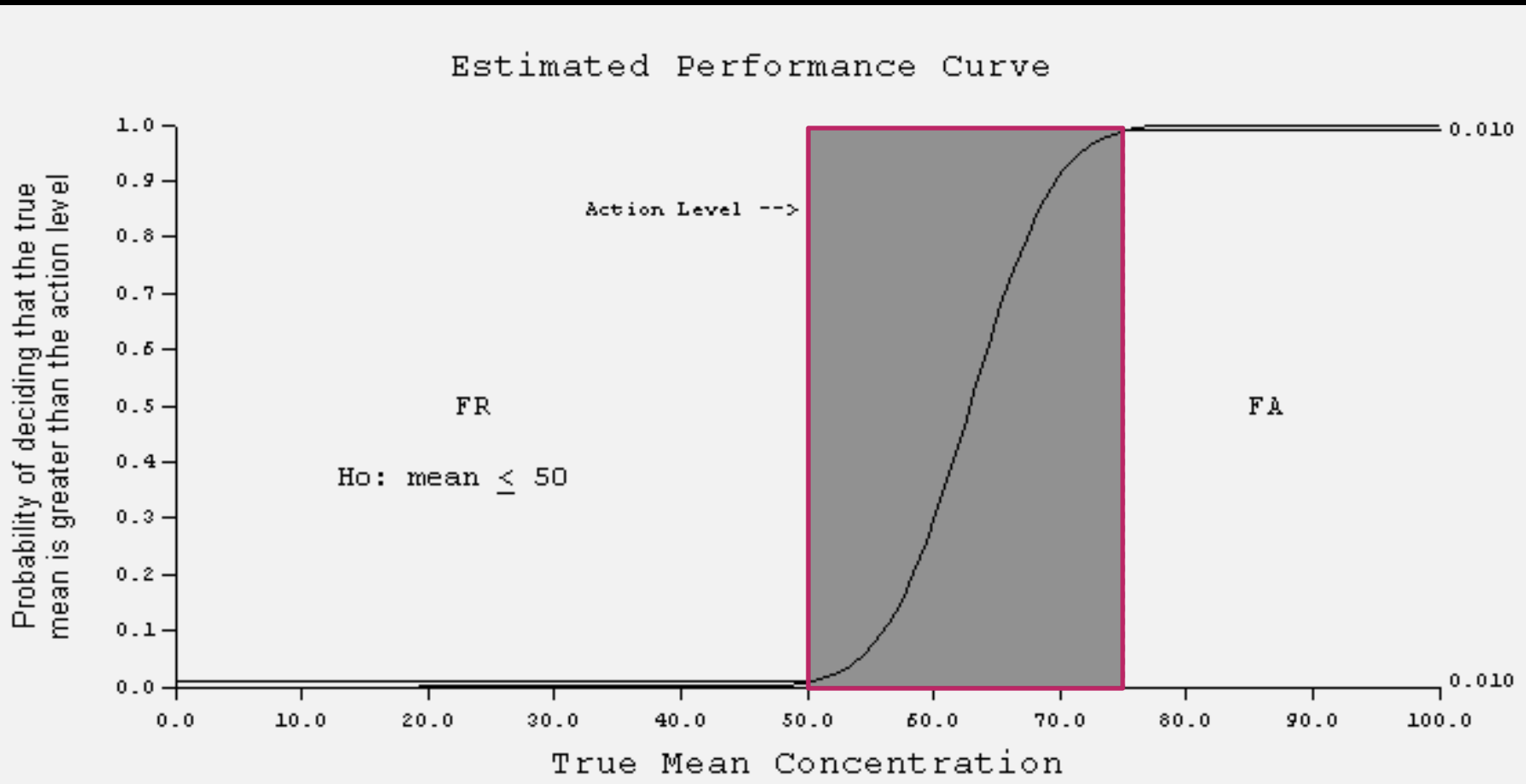


Automatic 3D R-T-L Chart



Complex Operational Controls

- Detect bimodal distributions
  - Counting statistics assume single Gaussian or Poisson distributions
  - Divergence due to actual airborne radioactivity can/will increase the actual standard deviation
    - Small intermittent puffs (too small to see as step changes) might show up as increases in the sigma
    - Radon activity may/is time dependent
  - Real time measurement of standard deviation allows adjustments to set points and may avoid false alarms or lack of true measurement sensitivity
  - Initial application would be to adjust alarm set points
  - Too complex for humans, but simple for processors



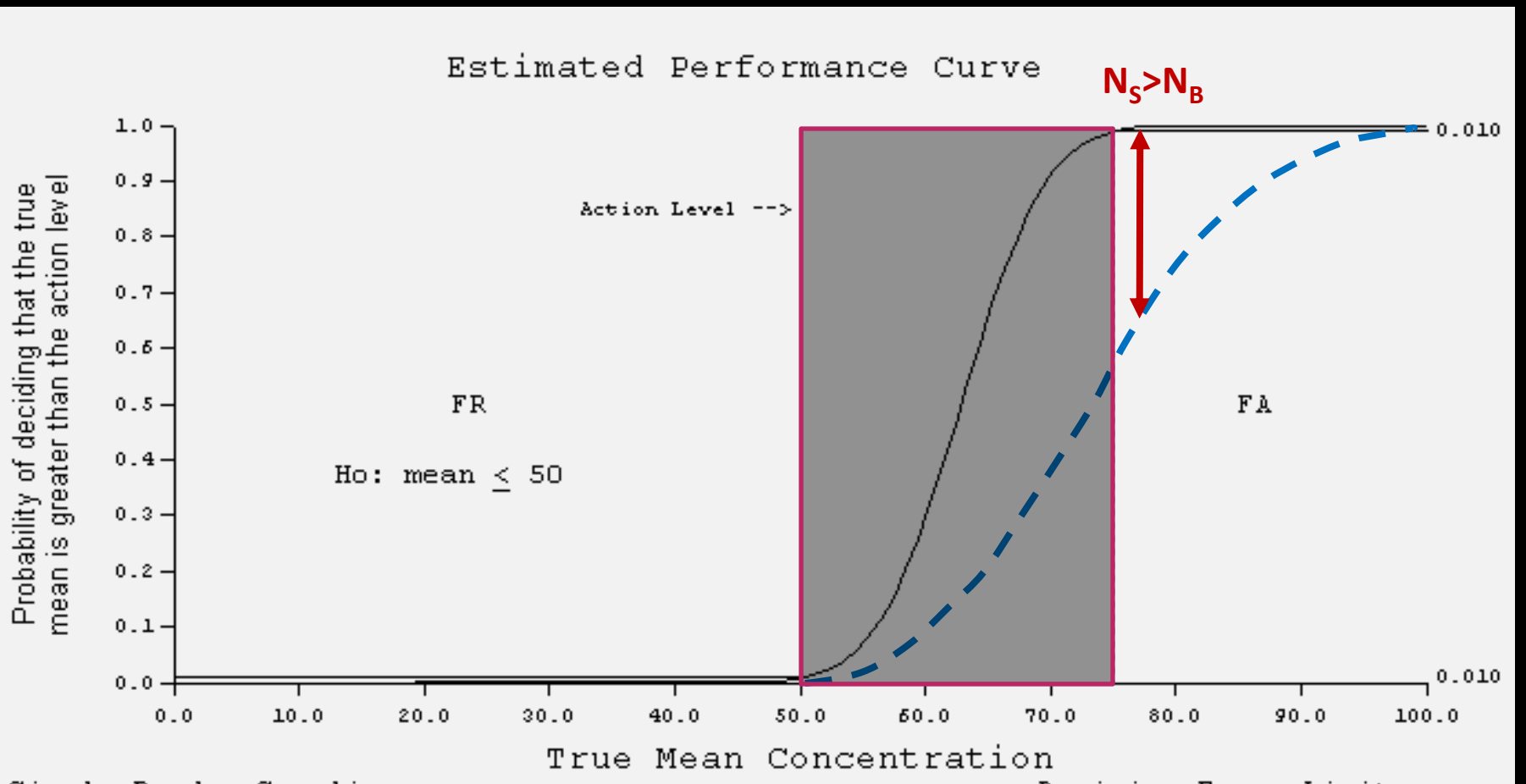
Simple Random Sampling
Action Level = 50.000
Cost = $13650.00
Sample Size = 13

Decision Error Limits

concentration	prob(E)	type
50.000	0.010	FR
75.000	0.010	FA

Why Measure Sigma?

- Standard sensitivity calculations assume:
  - MDC ~ SQRT(N_B^2 + N_S^ 2) where N_S => N_B
  - MDC ~ SQRT(2*N_B^2)
- However any situation that might produce chronic or intermittent airborne:
  - N_S > N_B
  - Then MDC ~ SQRT(2*N_B^2) underestimates
- Similar to LLD versus MDC analysis for labs
- Microprocessor power allows real time adjustment for air monitoring applications



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Adaptive Response

- Collect spectroscopy data
- Radio to remote computer for analysis
- Notify HP, supervisor or SME of unexpected results
- HP or SME review and concur
- Adjust efficiencies and set points in real time
- Detect fission products (e.g. Ce-144) where activation products were expected, for example

Enhanced Communications

- Alarms, equipment status, concentration measurements could be communicated by:
  - WiFi, cell phone text, Bluetooth
  - CAMs could text specific phones with status
  - HPT w/PDA could walk by monitors, get status
  - Use of generic data displays lowers costs
- Unattended monitoring – e.g. flow rate decline or delta P (loading)