

# Training for Semiconductor ESH

Brian Sherin

# Types

- Cognitive
  - Knowledge
  - Facts, figures, information
- Psychomotor
  - Action
  - Skills, tasks, activities
- Affective
  - Behavioral change
  - Personalization

**GOAL IS TO ULTIMATELY CHANGE  
BEHAVIOR**

# Maslow Hierarchy

Useful, satisfying  
learning

Positive reinforcement

Group norms

Knowing rules /  
expectations

Physical  
comfort

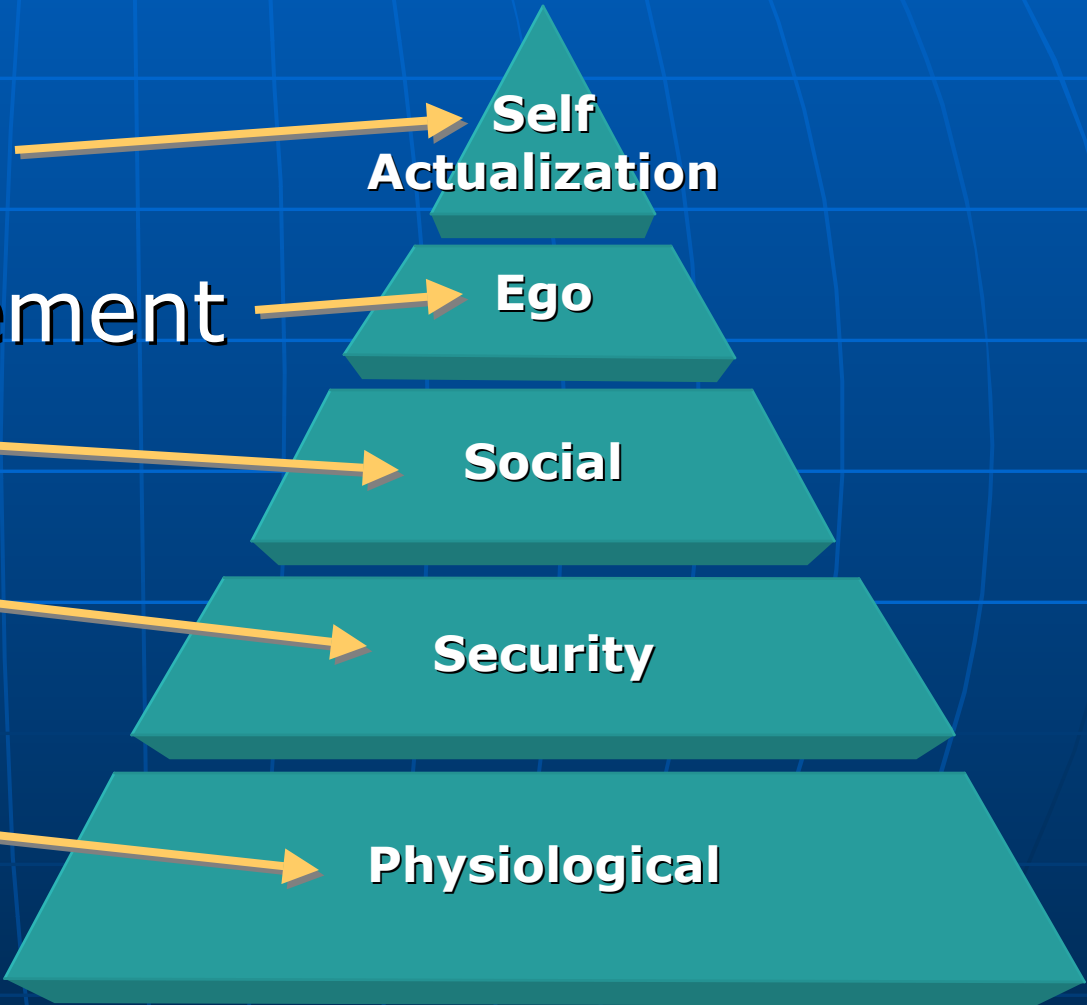
Self  
Actualization

Ego

Social

Security

Physiological



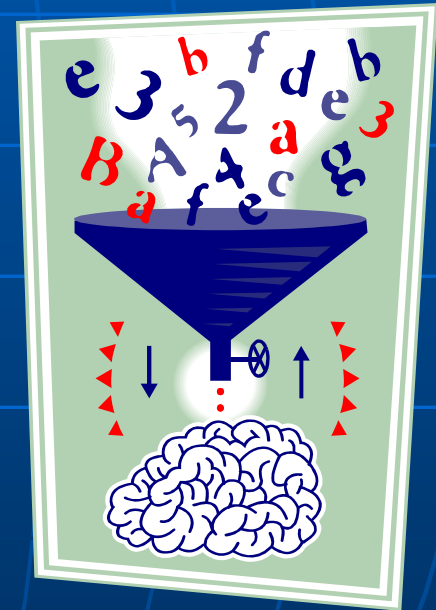
# Adult Learning

- Need Breaks
- Strong feelings about learning situations
- Occupations outside of class
- Decisions to make
- Problems to solve
- First hand experience
- Afraid of falling behind



# Adult Learning

- Non-verbal communication is important
- Self-directed
- Problem oriented
- Like to participate
- Analogy for understanding
- Collaborative
- Valuable input

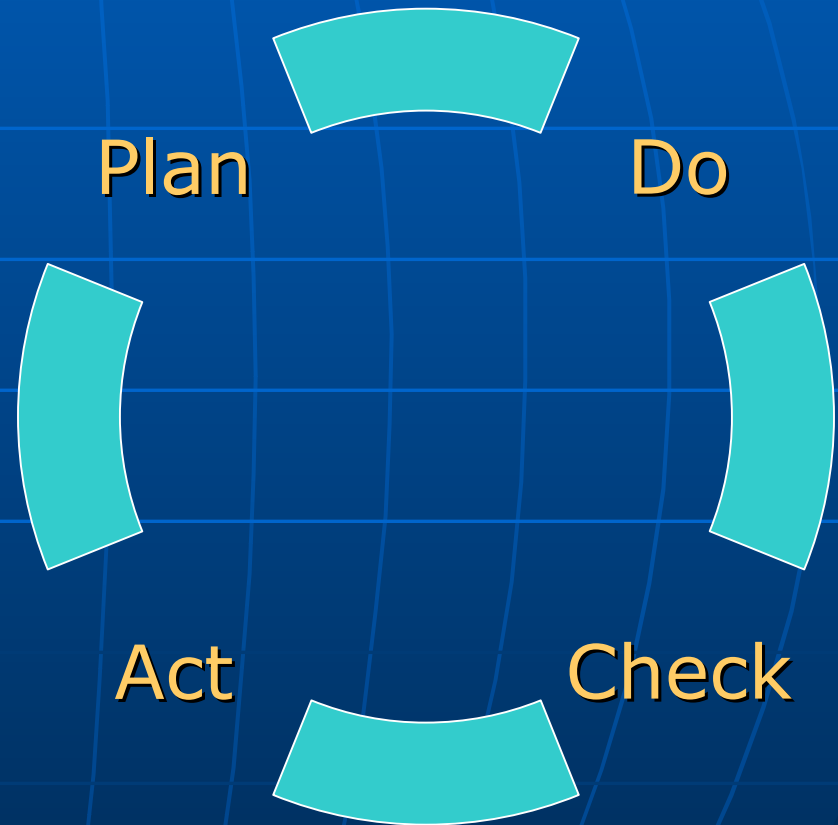


# When to train?

- Define the problem
- Decide if training is needed or if some other method would solve the problem
  - Engineering control
  - Motivation
  - Supervision
  - Disciplinary action
  - Practice
- Determine the type of training & delivery mechanism

# OSHA Training Guidelines

- Determine if Training is Needed
- Identify Training Needs
- Identify Goals and Objectives
- Develop Learning Activities
- Conduct the Training
- Evaluate Program Effectiveness
- Improve the Program



# Five Steps of Training

1. Tell them what to do
2. Show them what to do
3. Let them try it
4. Observe the behavior
5. Reinforce or redirect the behavior





# People remember...

- 10% of what they read
- 20% of what they hear
- 30% of what they see
- 50% of what they see & hear
- 70% of what they see and say
- 90% of what they say and do

“I hear, I forget, I see I remember, I do I understand”

—Chinese proverb

# Setting objectives

- Objective statements must be:
  - Specific
  - Observable
  - Measurable
- Describe the performance outcome...example:
  - We are here today to provide you with an overview of semiconductor EHS issues
  - At the end of this session you will be able to:
    - List 5 major process steps
    - Discuss the key safety & environmental issues facing the industry
    - Etc.

# Learning Activities

- Lecture
- Demonstration
- Hands-on Practice
- Demonstration & Hands-on
- Audiovisual
- Group Discussions

# Effective Delivery

- Know your subject
- Know your audience
- Have your materials ready
- Have the facility ready
- Stay on the topic
- Show appreciation for the participants

# Evaluation and Feedback

- Formal
- Informal
- Types:
  - Written exams
  - Practical exams
  - Oral exams
  - Project Assignments
  - Observations
- Feedback on instruction
  - Process improvement

# ESH Training Requirements for the Semiconductor Industry

- OSHA Pub. 2254 (1998): Training Requirements in OSHA Standards and Training Guidelines
- Covers all industries
- Semiconductor industry primarily covered by General Industry Safety Orders (29CFR1910)
- Secondary requirements under Construction Safety Orders (29 CFR 1926) for new facility construction
- State OSHA Plans and Local Training requirements

# Required Training in the Industry

- Hazard Communication
- Occupational Exposure to Hazardous Chemicals in Laboratories
- PPE
- Emergency & Fire Plans (Employees)
- Emergency Response Training
- Ionizing Radiation
- Hearing Conservation & Protection
- Flammable and Combustible Liquids
- Respiratory Protection
- *Process Safety Management of Highly Hazardous Chemicals*
- Powered Platforms, Manlifts, & Vehicle-Mounted Work Platforms
- Electrical Safety
- Control of Hazardous Energy

# Required Training in the Industry

- Haz Mat Transport (DOT)
- Hazardous Waste Operations
- Permit Required Confined Spaces
- Medical Services and First Aid
- Portable Fire Extinguishers
- Powered Industrial Trucks
- Welding, Cutting, and Brazing General Requirements
- Arc Welding and Cutting
- Inorganic Arsenic
- Lead
- Cadmium
- Bloodborne Pathogens



# Additional Training

- Injury & Illness Prevention Program
- ISO 14001 / EMS
- Office Ergonomics
- Manufacturing Ergonomics / Material Handling
- Non-ionizing radiation
- Laser Safety
- Behavioral Safety

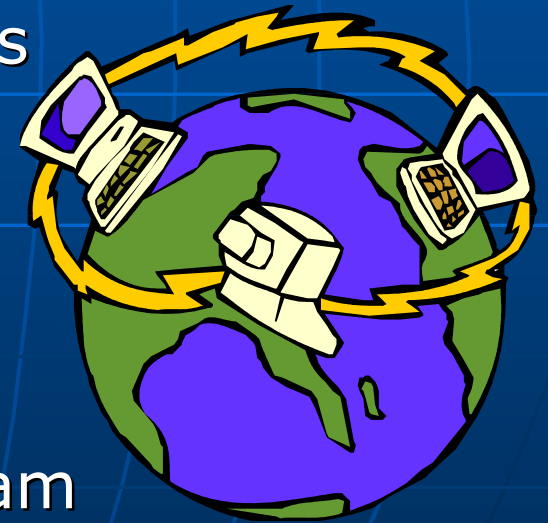
# New Training Technology

- Web-based applications
  - Distance learning (“synchronous” training)
  - Self-paced (“asynchronous” learning)
  - Blended learning
  - Learning Management Systems
  - Learning Content Management Systems



# WBT for ESH: Benefits

- Location independent
- Remote users / field personnel
- 2/3 of training costs are travel-related
  - (ref: WR Hambrecht & Co.)
- Efficiency: Time & Money
- Tremendous Return on Investments
- At least 50% time savings
- Customization
- Consistency of content delivered
- Automated administration and documentation
- Improved ability to measure program effectiveness



# WBT for ESH: Benefits

- User-centric
- Content Retention
- Accommodates Learner's learning style
- 25-60% greater than instructor-led
  - WR Hambrecht
- Self-Paced
- Can go back multiple times
- Not a passive participant due to interactivities
- Less intimidating than classrooms
- Assist in regulatory compliance



# WBT for ESH: Disadvantages

- Limited to general issues and not yet to skills training
- No ESH virtual reality training yet...little in the way of simulations
  - Solution: background awareness material can be covered before providing student with hands-on skill training
    - Ex: respirator training, powered industrial trucks
- Bandwidth Limitations
  - High-speed (T1/T3/DSL/Cable)
    - Great for rich multimedia (1.5-10 mbps)
  - Low Speed
  - 28K/33K/56K modems: content < 30-60Kb per page

# WBT for ESH: Disadvantages

- Initially more \$s to develop than Instructor-based training
- Learning is a social process; some face-to-face learning IS necessary
- No direct instructor interactions
- OSHA position in Compliance Letters (1994, 1997, 1999)
  - “In a computer-based program, this requirements (sic) may be providing a telephone hotline so that trainees will have direct access to a qualified trainer.”

