Evaluating Worker Exposures – The Future Is Arriving

The Risk Assessment & Control Landscape – Measuring Up to the Task, Defining the Future

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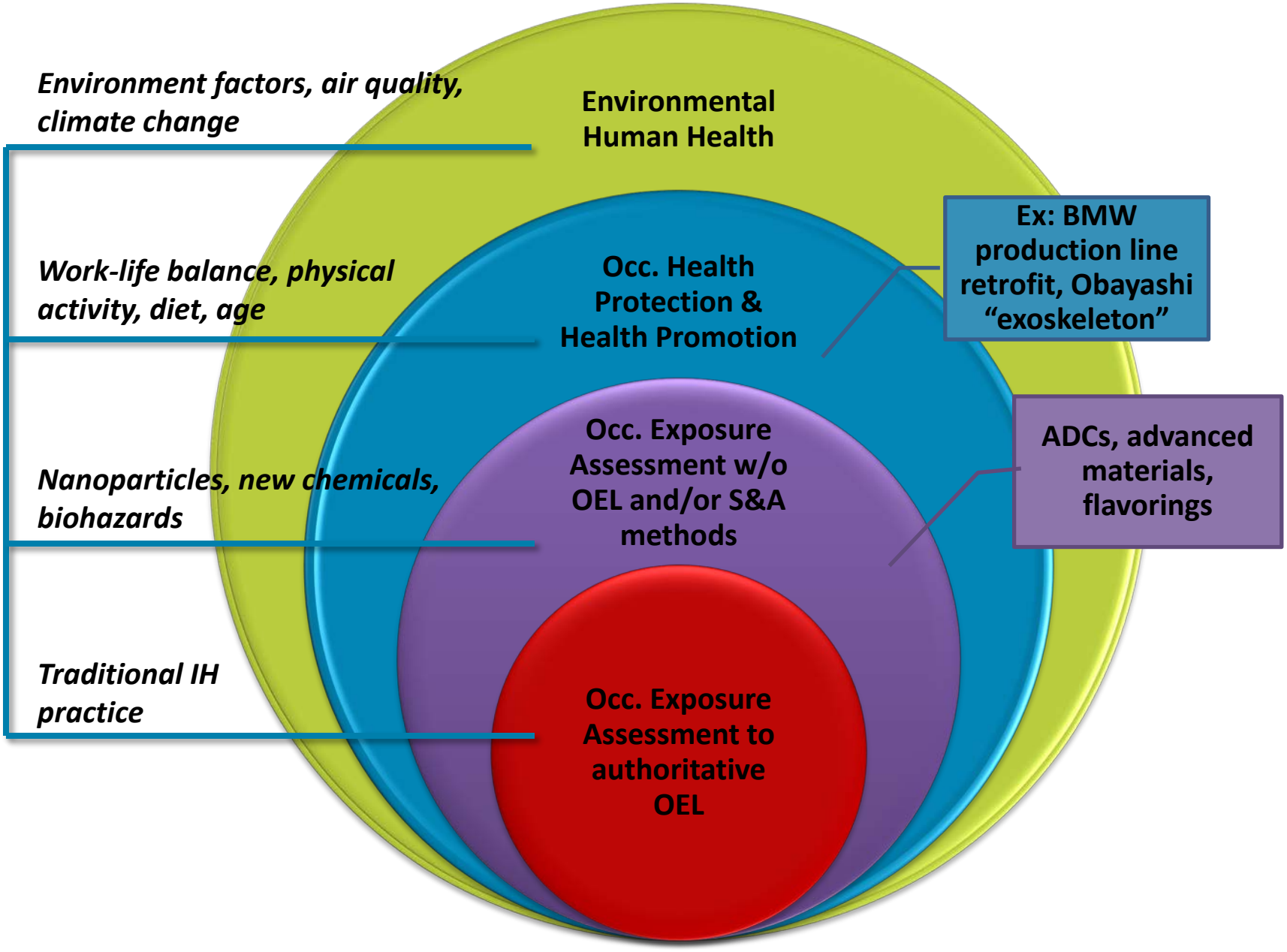
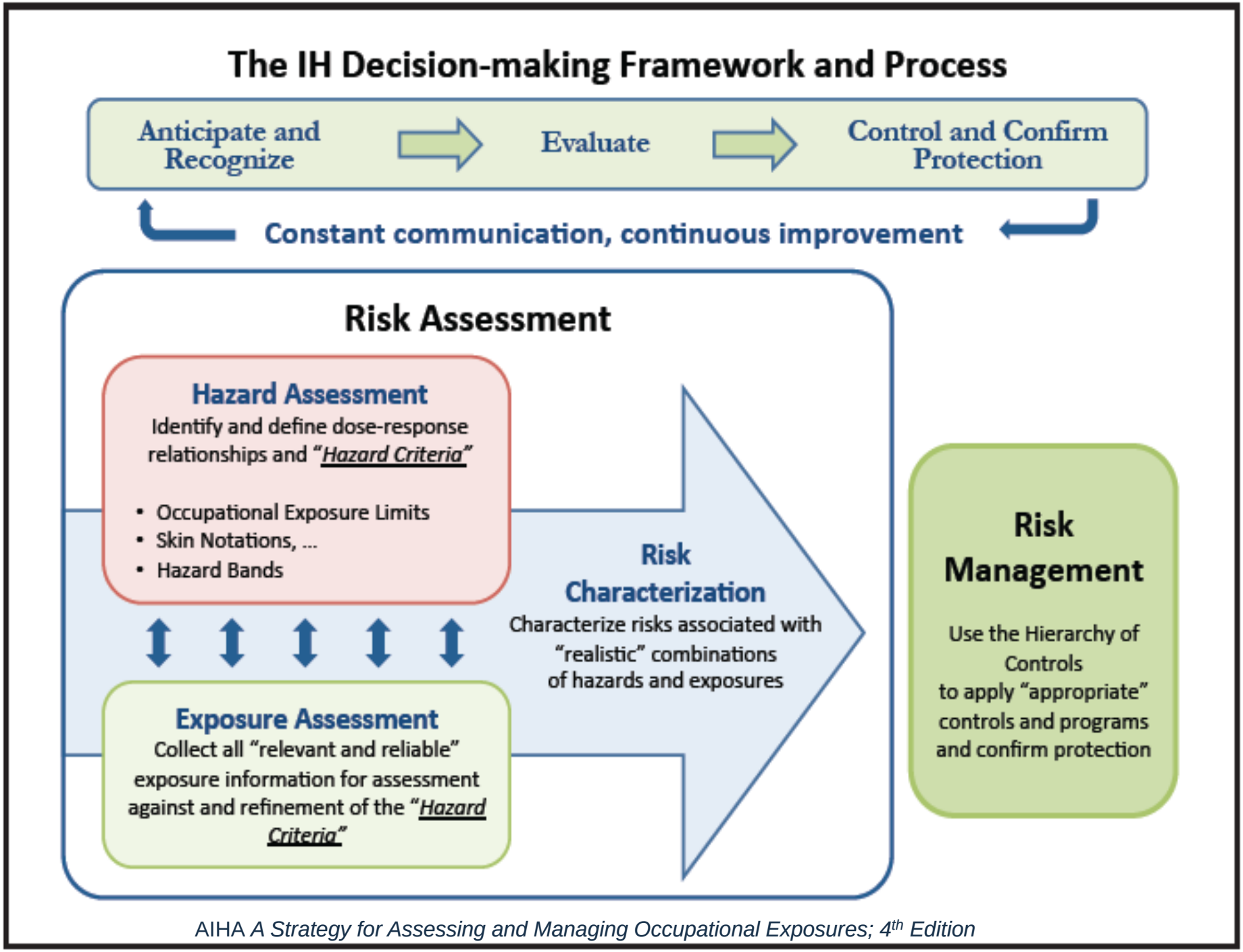
BUREAU VERITAS

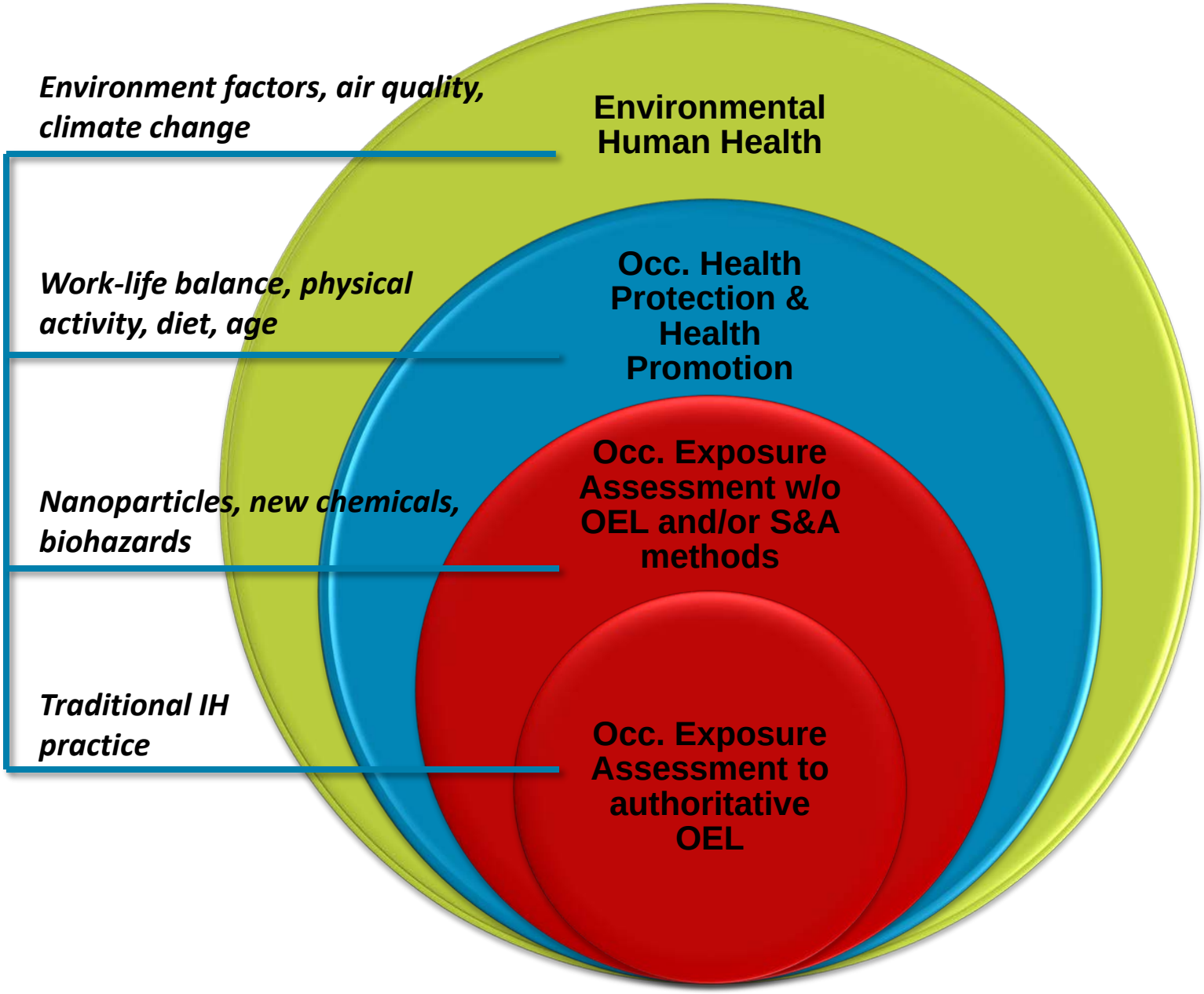


The World of Occupational Health Risk Evaluation



AIHA *A Strategy for Assessing and Managing Occupational Exposures; 4th Edition*


How will I include all of this in my IH practice?



The World of Occupational Health Risk Evaluation

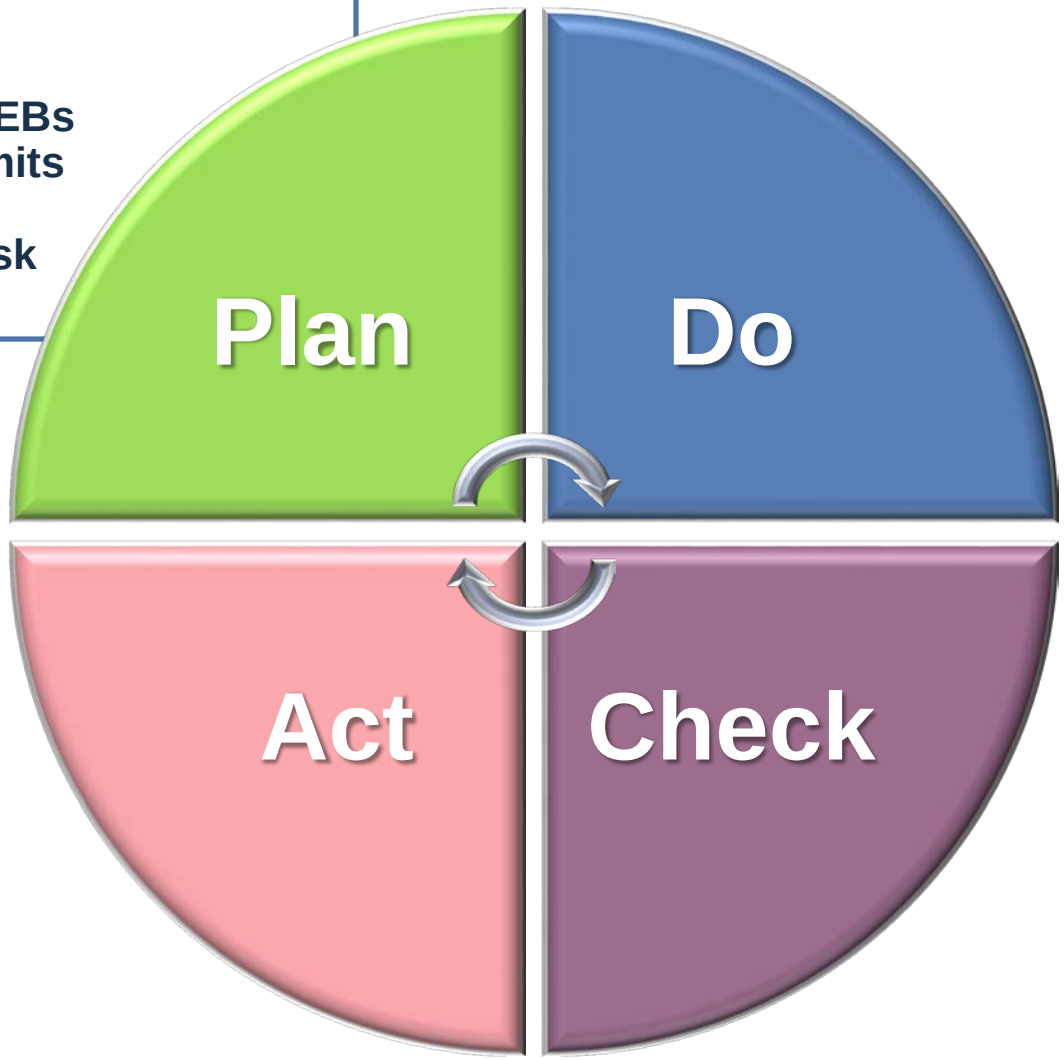
Management Systems Approach

Establish OSH policy

Allocate resources

Identify hazards. OEBs and/or exposure limits

Assess potential risk from exposure



Plan

- Establish policy
  - Policy addresses chemical agents without authoritative OELs
  - Example: Columbia University *http://www.ehs.columbia.edu/SafeUseOfChemicals.html*

"…to protect laboratory workers from adverse health effect …regardless of what hazardous substances are used."

- Allocate resources
  - OEB Tier 1; IH
  - OEB Tier 2; IH with specialized expertise, occupational toxicologist
- Identify hazards and exposure limits or bands
  - Ex. NIOSH OEB Guidance Document (pending) and AIHA BoK
- Assess potential risk from exposure

Assessing Potential Exposure Risks

Qualitative Example: dimethyl dicarbonate
(CAS 4525-33-1)

Signal word: Danger

Acute toxicity via inhalation (Acute Toxicity 2)

Corrosive to skin (Skin Corr. 1B)

OEB: Band D/E

No authoritative OEL

No sampling or analytical method

No sensor technology

Well within our IH capabilities!

- ✓ Consider substitution
- ✓ Closed transfers
- ✓ Ventilation known to control exposures to < 1 PPM
- ✓ Skin and eye protection, RPE
- ✓ Access to safety shower and eyewash
- ✓ Life cycle assessment; from receipt to ultimate disposal

Management Systems Approach

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Identify hazards and exposure limits

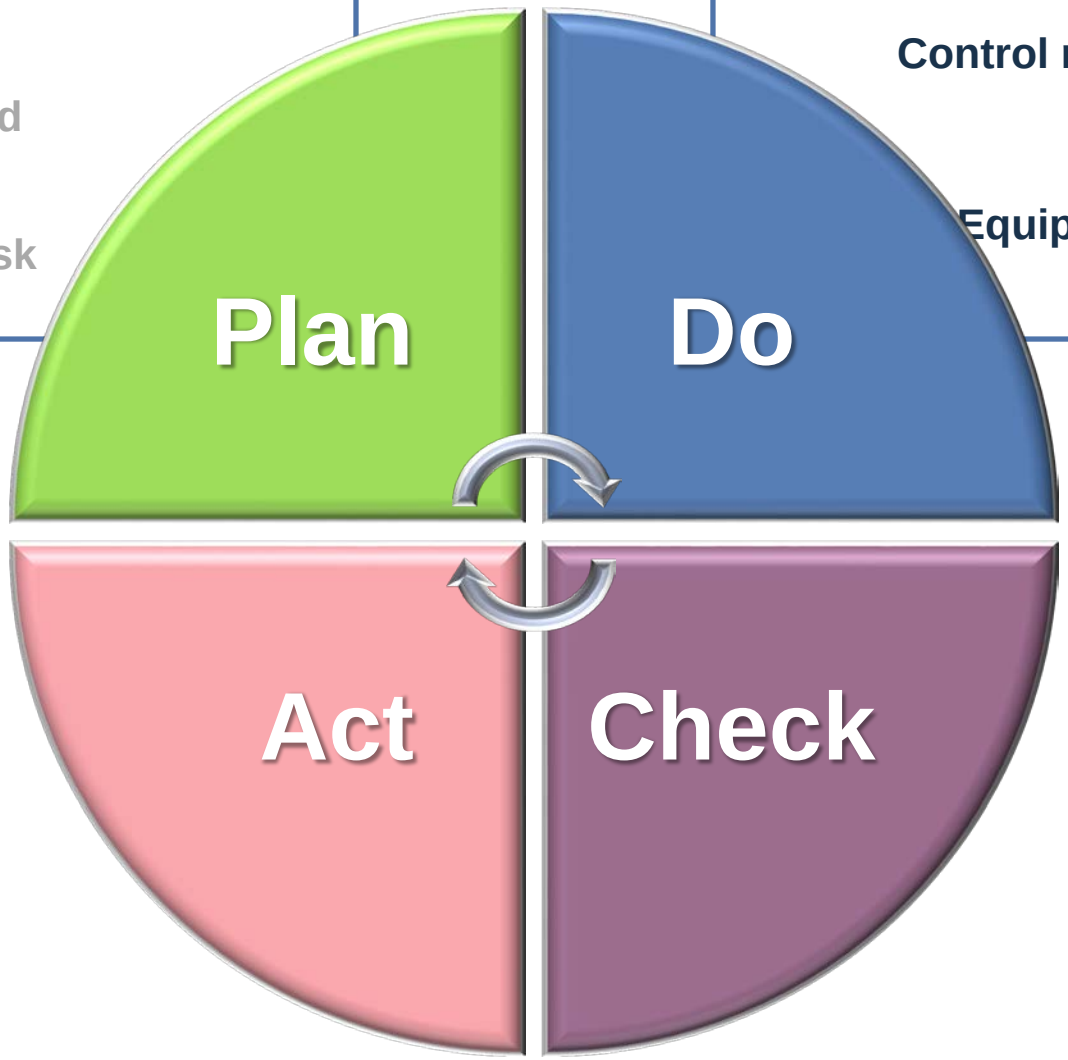
Assess potential risk from exposure

Eliminate and substitute hazards

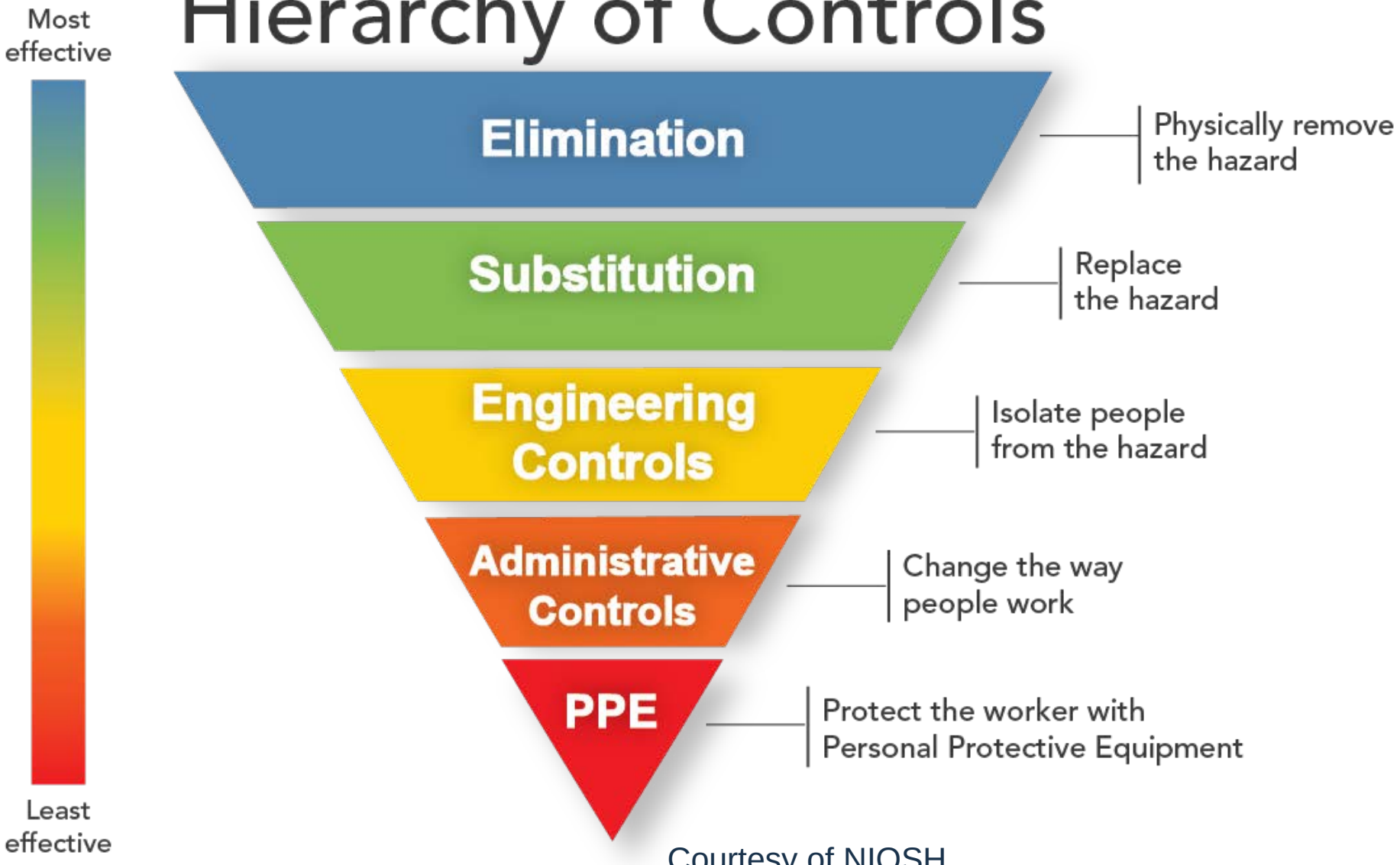
Control residual exposures

Equipment retrofit

Equipment procurement



Hierarchy of Controls



Courtesy of NIOSH
http://www.cdc.gov/niosh/topics/noisecontrol/

Do

- Eliminate and substitute hazards
  - Tier 1 provides a rapid and defensible method
  - GHS Hazard Categories that prompt “D” and “E” OEBs indicate the potential for irreversible health effects at relatively low doses

Hazard Class	Hazard Category			
Acute Toxicity	1	2	3	4
Skin Corrosion/Irritation	1A	1B	1C	2
Serious Eye Damage/ Eye Irritation	1	2A	2B	
Respiratory or Skin Sensitization	1			
Germ Cell Mutagenicity	1A	1B	2	
Carcinogenicity	1A	1B	2	
Reproductive Toxicity	1A	1B	2	Lactation
Specific Target Organ Toxicity (STOT) – Repeated Exposure	1	2		

Selecting the Appropriate Controls

Including ALL Chemical Hazards into the Design Process

Stage	Activities
Conceptual Design	Establish IH goals, identify IH hazards and associated regulations and standards. Identify relevant OELs and/or agents of concern.
Preliminary Design	Eliminate hazards, if possible. Substitute less hazardous agents / processes, and establish risk minimization targets for remaining hazards (OELs and OEBs). Qualitative exposure assessment; develop control alternatives.
Detailed Design	Select controls. Conduct Process Hazard Reviews.
Procurement	Develop specifications and include in procurements. Develop test protocols for factory acceptance testing and commissioning.
Construction	Construction site safety and contractor safety.
Commissioning	Factory acceptance and operational qualification testing. SOPs. Exposure assessments. Mgmt. of residual risks.
Start Up and Occupancy	Education. Management of change. Modification of SOPs.

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Exposure control verification

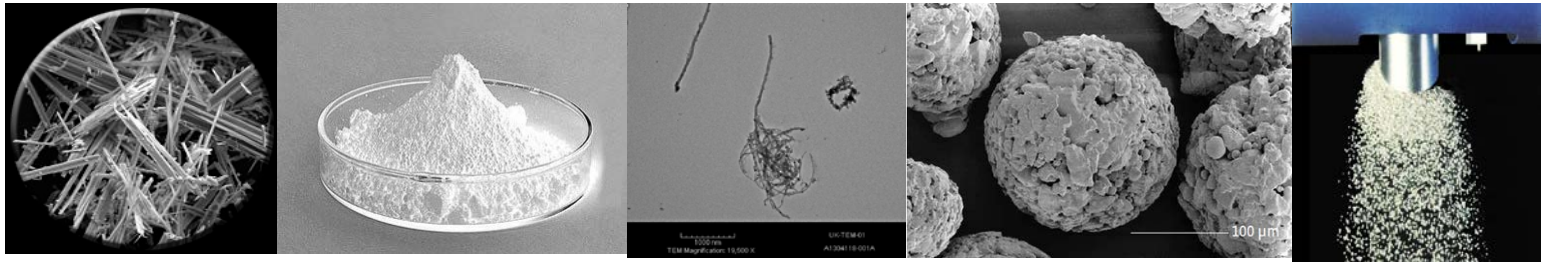
Develop SOPs

Train workers

Health surveillance

Check

- Exposure control verification
  - Historical data
  - Modeling
  - Surrogates must consider
    - Physical Form
    - Morphology
    - Limit of Detection
    - Particle Size
    - Hygroscopy
    - Flowability



  - Exposure control verification using surrogates must replicate the work environment, including work practices and PPE, that the workers will use

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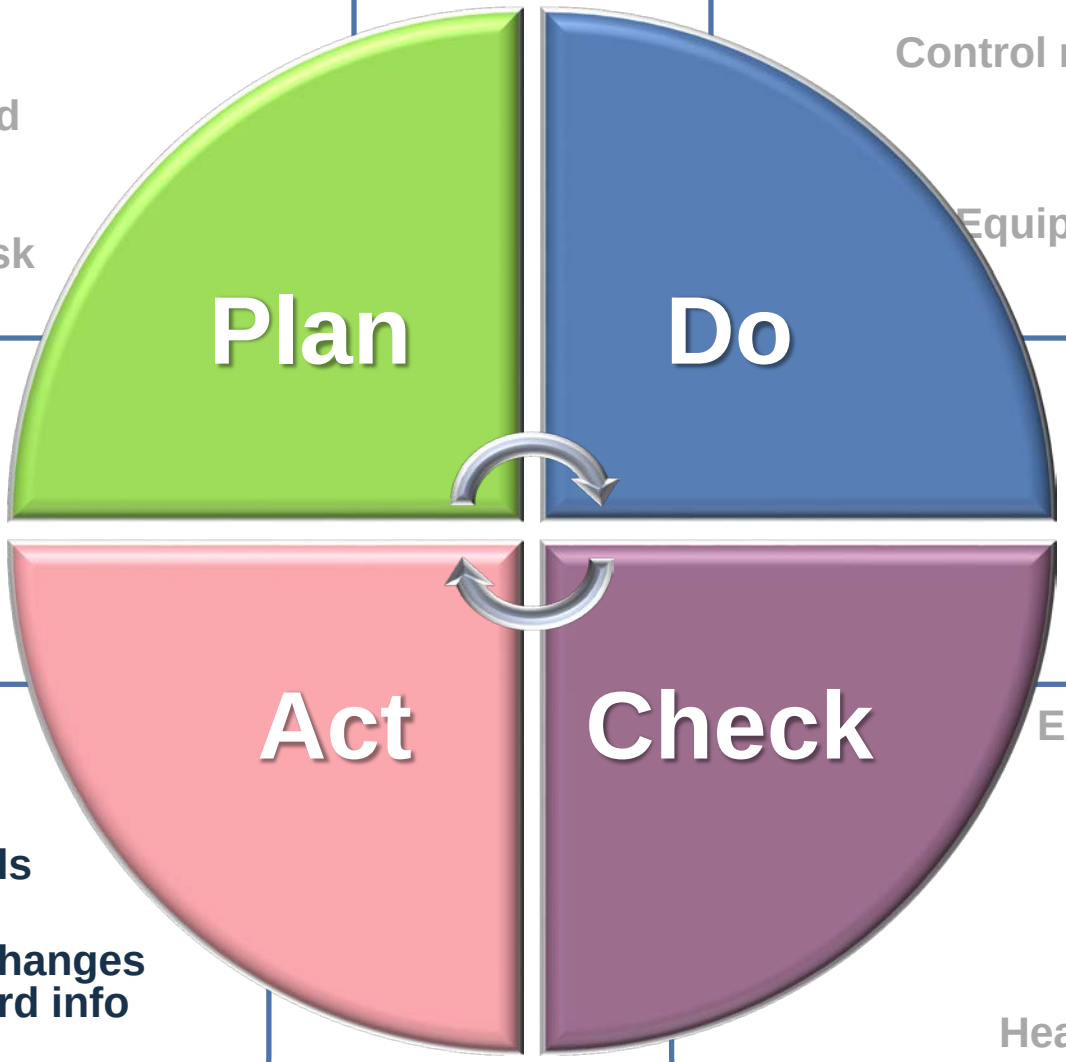

Assess ongoing effectiveness

Supplement controls

Make appropriate changes based on new hazard info

Exposure control verification

Develop SOPs

Train workers

Health surveillance

Act

- Make appropriate changes based on new hazard info
- Recent examples
  - Pesticides
  - Fumigants
  - Carbon nanotubes and nanofibers
  - Nano silver
  - Beryllium
  - Silica
  - Flavorings

Business Value of Worker Health

- Estimated costs of $250B*/year
  - The medical costs associated with occupational disease and injury: $67B
  - Productivity costs $183B, including current and future lost earnings and fringe benefits

*Leigh, J. P. (2011), Economic Burden of Occupational Injury and Illness in the United States. Milbank Quarterly, 89: 728–772.

- An Integrated Health and Safety Index has been proposed
  - Translates the impact of employer health and safety programs into business value for the investment community

Ultimately, the value of a company can be seen as the health of its workforce

Dr. Robert McLellan, co-author of Integrated Health and Safety model

Integrated Health and Safety Index

Source: 2015 American College of Occupational and Environmental Medicine

AIHA Strategic Direction and Content Priorities

- **Vision:** Elimination of Workplace Illnesses
- **Mission**: Creating Knowledge to Protect Worker Health
- **Content Priorities:**
  - **Exposure Banding/OEL Process**
  - Sensor Technologies
  - Emerging Markets/Global IH/OH Standard of Care
  - **IH Value Strategy/Business Case Development**
  - **Changing Workforce Demographics/Environment**
  - Big Data/Data Management and Interpretation

AIHA®
Protecting Worker Health

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