

YUMA PACIFIC

San Diego, California

January 22, 2016

Unintended Consequences of Risk Management

Fred Boelter, CIH, PE, BCEE, FAIHA



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Classic ARECC Math

$$RISK = f \frac{(Bad\ Effects)}{Exposure}$$

2

Risk = Exposure/OEL

Risk = Hazard x Exposure

Risk = Hazard x Probability

Risk = Hazard + Outrage

Risk = Hazard x Exposure/Engagement

Risk = Consequence x Punctuated Reality

3

A Risk Definition



Risk is a socially constructed and culturally mediated concept that is used to give meaning to things, forces or circumstances that pose danger to people or what they value.

Fred Boelter, Smyth Lecture, 2014
Characterize, Communicate, Influence: Science at Our Core

Risk Momentum

- **AIHA *The Synergist***
- **BOHS**
- **SRA**
- **AIHce**
- **2015 Fall Conference**
- **BoK process**
 - **Exposure assessment**
 - **Risk assessment**

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Ed Rutkowski – Editor

Something is new about risk in The Synergist

The Synergist - long published regular columns on risk assessment and risk communication.

2015 articles with “risk” in their title.

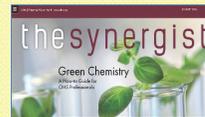
- Assessing Risk with NFPA 70E, <https://www.aiha.org/membercenter/SynergistArchives/2015Synergist/Pages/Insight-Safety-02.aspx>
- ABC’s and Asbestos Risk Assessment, <https://www.aiha.org/membercenter/SynergistArchives/2015Synergist/Pages/Insight-RiskAssessment-04.aspx>
- Shifting the Conversation: Opportunities and Challenges in Exposure and Risk Science <https://www.aiha.org/membercenter/SynergistArchives/2015Synergist/Pages/Insight-RiskCommunication-04.aspx>
- Characterizing Risk, <https://www.aiha.org/membercenter/SynergistArchives/2015Synergist/Pages/Insight-RiskCommunication-09.aspx>
- Making Sense of “Risks and Opportunities”, <https://www.aiha.org/membercenter/SynergistArchives/2015Synergist/Pages/Insight-Management-Systems-11.aspx>

Peter Sandman’s - politics of risk communication v effective interventions.

2015/2016 four part risk series - new and different, has explicit focus on influencing behavior.

AIHA Synergist 2015/2016 Risk Series

- April 2015 - Shifting the Conversation: Opportunities and Challenges in Exposure and Risk Science (BoK)
- September 2015 - Characterizing Risk: Messaging, Framing, and Context Matter (IOHA/BOHS)
- January 2016 - Total Worker Health™ and Cumulative Risk Assessment: A Vision for the Future (AIHA Fall Conference)
- March 2016 - The Art and Science of Effective Risk Management: A Shared Understanding of Success (SRA Conference)



SRA

- Very broad risk approach
 - Financial, enterprise, global, terrorism
- OHSSG update
 - Hearl, Finkel, Boelter, Guidotti
- Joint with AIHA
 - Pam Williams past president
 - Webinars
- December conference highlights
 - R code & brain (statistics and communication)
- Early career plenary
- ASSE
- NIOSH - Total Worker Health (TWH)
- NIOSH – Cumulative Risk Analysis/Occupational Risk Factors (CRA/ORF)
- 35 years after benzene decision
- Risk communication
 - Worker, public, behavior

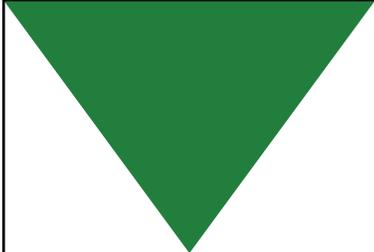


**Monte Carlo and probability bounds
analysis in R with hardly any data**

Scott Ferson, Applied Biomathematics and Stony Brook University

 Society for Risk Analysis Annual Meeting

© 2015 Applied Biomathematics



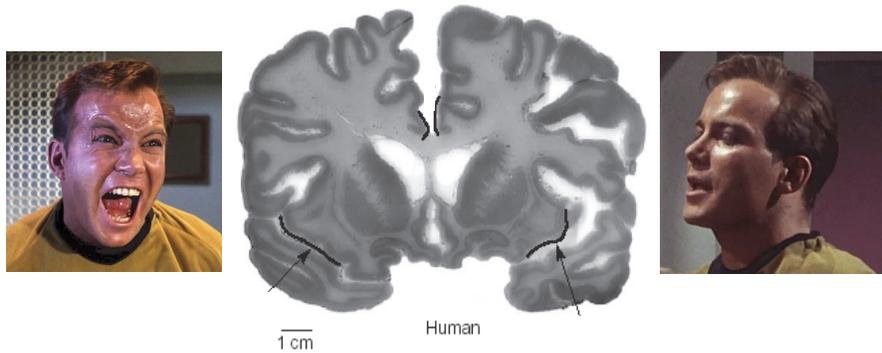
Neuroscience of risk

Decade of the Brain ('90s)

Neuroscience of risk perception

(Marr 1982; Barkow et al. 1992; Pinker 1997, 2002)

Instead of being divided into rational and emotional sides, the human brain has *many* special-purpose calculators



American Society of Safety Engineers

Risk Assessment Institute

Corporate Decision Making Using Risk Assessments –

Methodology for Systemizing Risk Reductions using the Hierarchy of Controls
1 380 558 025

Paul Esposito
President, STAR Consultants
www.starconsultants.net

Advancing Excellence in OSH Risk Assessment and Management

Residual Risk

- ▶ Risk remaining after risk “treatment”
 - NOTE 1: Residual risk can contain unidentified risk.
 - NOTE 2: Residual risk can also be known as “retained risk”.

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SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF MICHIGAN

Aged in the Bottle: It's Time to Uncork the Supreme Court's 1980 Gift to Risk Analysis and Public Protections

Society for Risk Analysis Annual Meeting
December 9, 2015
Arlington, VA

Adam M. Finkel, Sc.D., CIH
Senior Fellow, Penn Law School and Executive Director, Penn Program on Regulation
and Clinical Professor of Environmental Health Sciences, Univ. of Michigan School of Public Health

Penn Program on Regulation



Penn Law
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“The requirement that a ‘significant’ risk be identified is not a mathematical straitjacket. It is the Agency’s responsibility to determine... what it considers to be a ‘significant’ risk. Some risks are plainly acceptable and others are plainly unacceptable.”

- from majority opinion

Penn Program on Regulation



Acceptable Risk: A Willing Suspension of Hierarchical Assumptions Part 1

Session M2-1 – SRA Annual Meeting – Arlington, Virginia – December 7



Fred Boelter, RHP Risk Management, Boise, ID
Session Arranger and Moderator



Ben Heckman, RHP Risk Management, Carlisle, PA
Hunters Point: What is the Influence of Community Outrage on Risk Perception?



Mary Fox, Johns Hopkins University, Baltimore, MD
Environmental meetings involving the community: What is meant by acceptable risk?



Michael Larranaga, Ramboll, Dallas, TX
Probabilistic analysis and the implications of Black Swans when communicating risks



Mary O'Reilly, ARLS Consultants, Syracuse, NY
Banding as a risk communication tool for workers and the general public



2015 Annual Meeting

Background – HPS

1945 - Employed 18,000 shipyard employees



Photo caption: "In 1948, Hunters Point Naval Shipyard was active and providing jobs — but also contaminating the site." SF Chronicle, *Housing blooms at last at once-toxic Hunters Point shipyard site*, June 8, 2015 <http://www.sfchronicle.com/science/article/Housing-blooms-at-last-at-once-toxic-Hunters-6314858.php>

Community perceptions and role

South Baltimore

- Findings – health improving, a community in transition
- Residents not surprised by findings
- Felt they were part of the solution

Spring Valley, DC

- Findings – community health is good, increasing cancer rate trends not likely associated with contamination
- Some residents critical of data limitations, findings
- They have been wronged and disrupted for an extended time



Communication

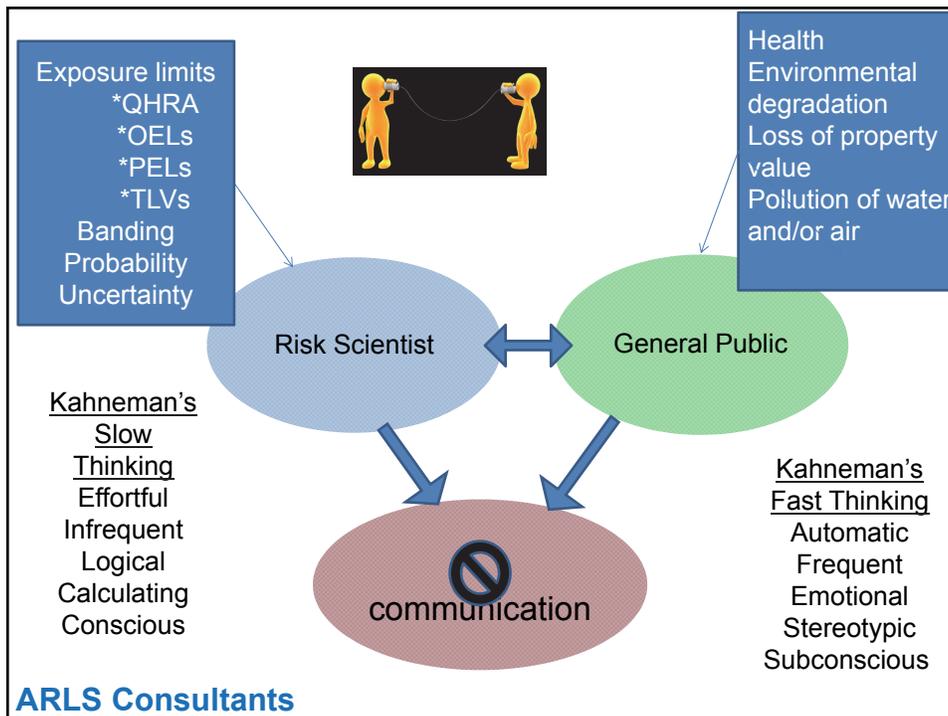
- Focus on consequences, not probabilities.
- Preparation increases resiliency.
- Resiliency drives response.
- Changing attitudes.
- Communication through all network channels.

| Newtonian | Non-Newtonian |
|--------------------|-------------------|
| Equi-likely events | Lop-sided events |
| Regression to mean | No mean value |
| Vanishing extremes | Non-zero extremes |



RAMBOLL

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Acceptable Risk: A Willing Suspension of Hierarchical Assumptions Part 2

Session M3-I – SRA Annual Meeting – Arlington, Virginia – December 7



Fred Boelter, RHP Risk Management, Boise, ID
Session Arranger and Moderator



Tom Cunningham, CDC/NIOSH-EID, Cincinnati, OH
The Healthy Worker Syndrome: Non-occupational exposures, stressors, and risks



Mark Cunningham-Hill, Johnson & Johnson, New Brunswick, NJ
Implementing Total Worker Health™: A story of wellness and prevention



Harold Blackman, Boise State University, Boise, ID
Applying behavior based human factors engineering and defense-in-depth to communicate and achieve risk management objectives

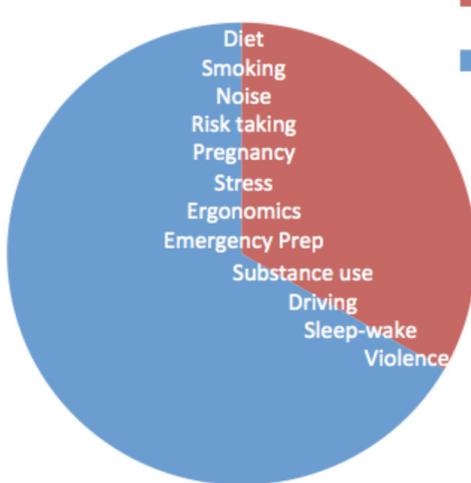


Scott Dotson, CDC/NIOSH-EID, Cincinnati, OH
The cumulative risk assessment project: Characterizing and communicating occupational and non-occupational risks



2015 Annual Meeting

Where are Health Risks?



■ Work

■ Home

Source: Dr. Kent Anger, Oregon Health and Science University, 2014.

Department of Health and Human Services
 Centers for Disease Control and Prevention
 National Institute for Occupational Safety and Health




Individually-Focused Behavior Change Interventions **Not** Enough

“It is unreasonable to expect people to change their behavior when the social, cultural and physical environments around them fully conspire against them...”

Source: Sir Michael Marmot, APHA 2014



We all have reasons for why Health matters

Usually personal in nature

I want to be vibrant in my old age

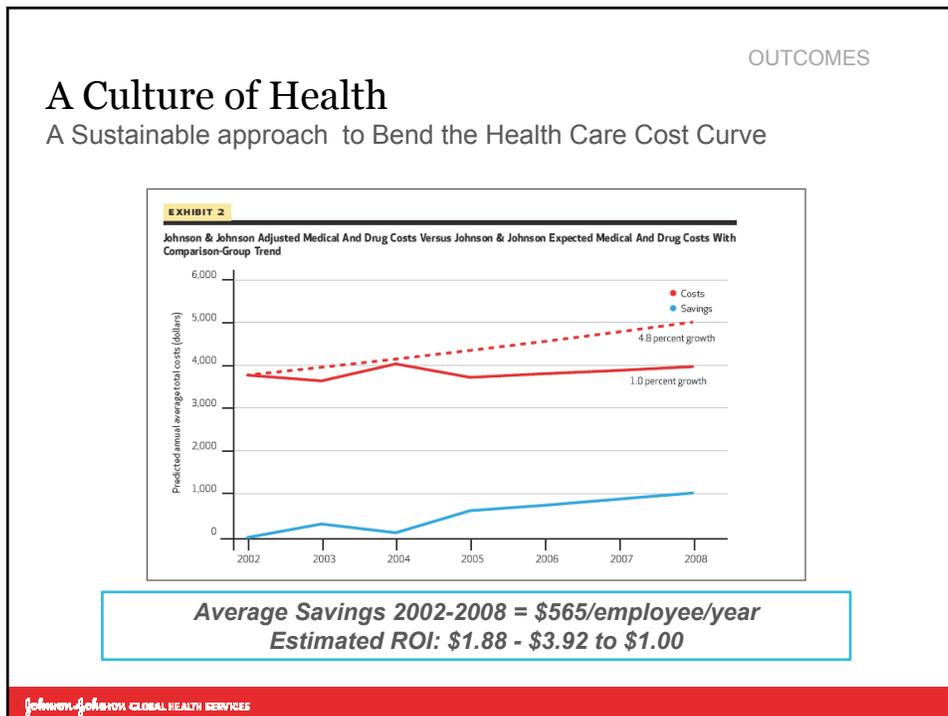
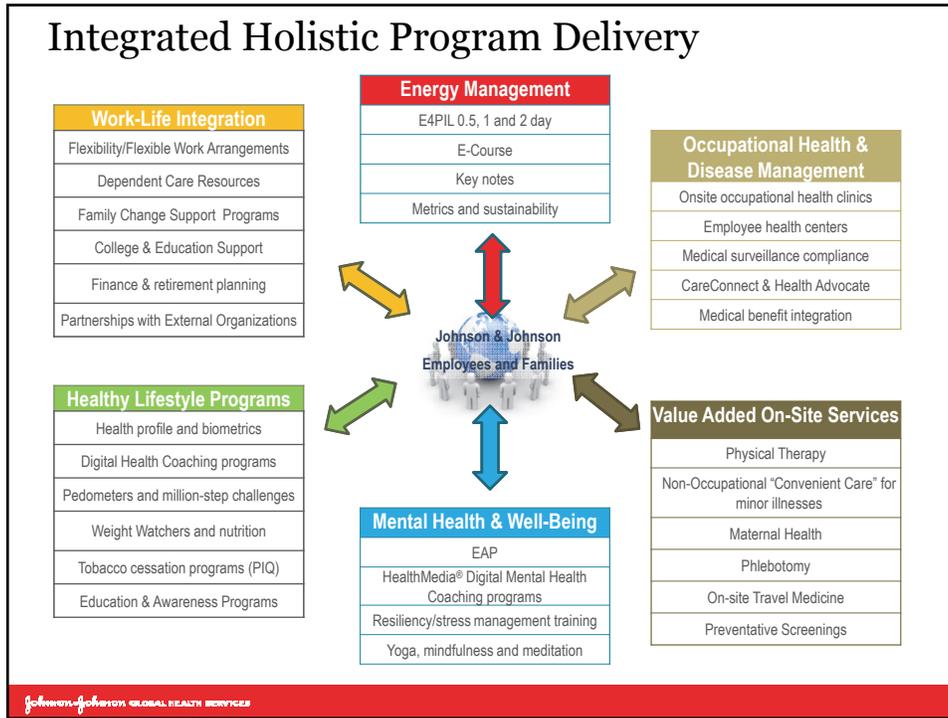
I want to be an energetic mother / father

I want to look and feel better

I don't want to be sick!

I want to provide for myself and family to the best of my capabilities

GLOBAL HEALTH SERVICES





BOISE STATE UNIVERSITY

What has been done and how effective are these human factor efforts?

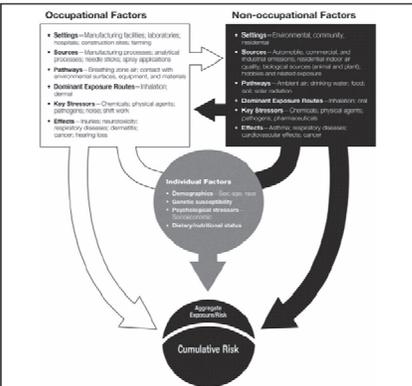
- Integrated Design ➔ Inclusion of human, and machine in functional and organizational context
- BBS, VPP ➔ Identify and eliminate at risk behaviors
- Quality Improvement ➔ Incremental process improvement
- Accident Investigations ➔ Identify actions to prevent future events

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Integrating ORF into CRA

- Most CRA efforts aimed at environmental risk assessment
- Need to introduce the occupational domain into CRA

- Why?
 - Occupational risk factors (ORF) impact overall health and well-being
 - Non-ORFs influence workers
 - Knowledge of the interactions will foster better decision making and enhanced risk management strategies



Occupational Factors

- **Settings** - Manufacturing facilities, laboratories, hospitals, construction sites, farming
- **Sources** - Manufacturing processes, analytical processes, health care, spray applications
- **Pathways** - Direct contact with environmental particles, equipment, and materials
- **Dosimetry** - Exposure Rates - (Hazard) x (Time)
- **Key Stressors** - Chemicals, physical agents, pathogens, noise, shift work
- **Effects** - Chronic neurotoxicity, respiratory disease, dermatitis, cancer, hearing loss

Non-occupational Factors

- **Settings** - Residential, community, schools
- **Sources** - Automobile, commercial and industrial products, residential indoor air quality, biological, personal care and food, tobacco and related products
- **Pathways** - Direct or indirect water, food, soil, air, tobacco
- **Exposure Routes** - Inhalation, ingestion
- **Key Stressors** - Chemicals, physical agents, pathogens, pharmaceuticals
- **Effects** - Asthma, respiratory disease, dermatitis, cancer, hearing loss

Individual Factors

- Demographics - Sex, age, race
- Genetic susceptibility
- Psychological stressors
- Socioeconomic status

Cumulative Risk

Non-Occupational Cumulative Risk

FIGURE 2. Illustration of the relationship between key factors considered in cumulative risk assessment. The figure lists key risk factors that may contribute to aggregate and cumulative risk. The primary factors are organized into three categories: (1) occupational factors, (2) non-occupational factors, and (3) individual factors. For each category, examples of the primary settings, sources of risk, exposure routes, key stressors, and effects are included to aid in listing considerations that should be included in assessing aggregate and cumulative risk to various workers.




John Howard - AIHA Fall Conference



“Keep stretching the topic of risk until it breaks”

Stability is no longer the norm.

- **1880—1980**
 - Growth of companies created by industrial revolution
 - Vertical organizational structure differentiated jobs from one another more clearly than ever before
 - Good job was being an employee of a particular company for your entire working life
 - Government built social welfare laws along these lines:
 - Workers got security, benefits, protections, and steady wage rises
 - Companies got stable workforce in which they could invest with fair expectation of positive returns

Source: Dr. John Howard, AIHA Fall Meeting 2015.

21st Century World of Work

- **Salarit**
 - Those who hold steady, **old-fashioned jobs** at fixed workplaces, which are dwindling in the private sector and are now located mostly in government
 - **Boelter Note:** President Obama said in his 12Jan2016 State of the Union address “We also need benefits and protections that provide a basic measure of security. After all, it’s not much of a stretch to say that some of the only people in America who are going to work the same job, in the same place, with a health and retirement package, for 30 years, are sitting in this chamber. For everyone else, especially folks in their forties and fifties, saving for retirement or bouncing back from job loss has gotten a lot tougher.”
- **Proficians**
 - Those who are highly educated and sell advanced skills that have grown in value in the knowledge economy and who more and more are **multinational and voluntarily migratory** workers
- **Precariat**
 - Those for whom employment is typically **short-lived, uncertain, involuntarily migratory**, and delivered without a health, injury compensation, or social pension benefits package

(Adapted by Dr. Casey Chosewood from: Dr. Guy Standing, Professor of Economics, SOAS, University of London; from his book, *A Precariat Charter*.)

Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

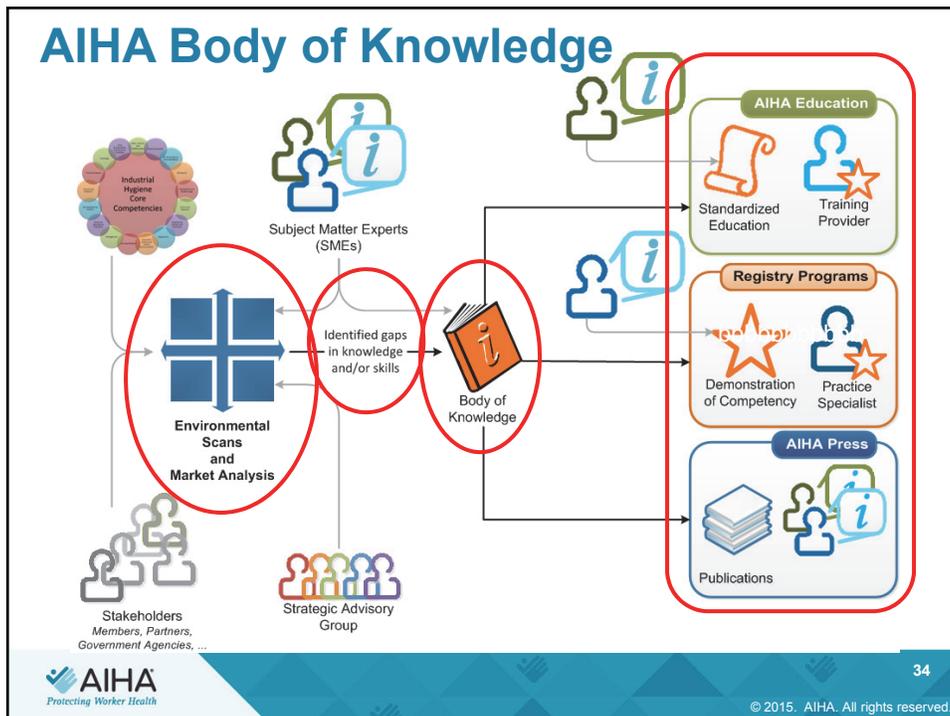
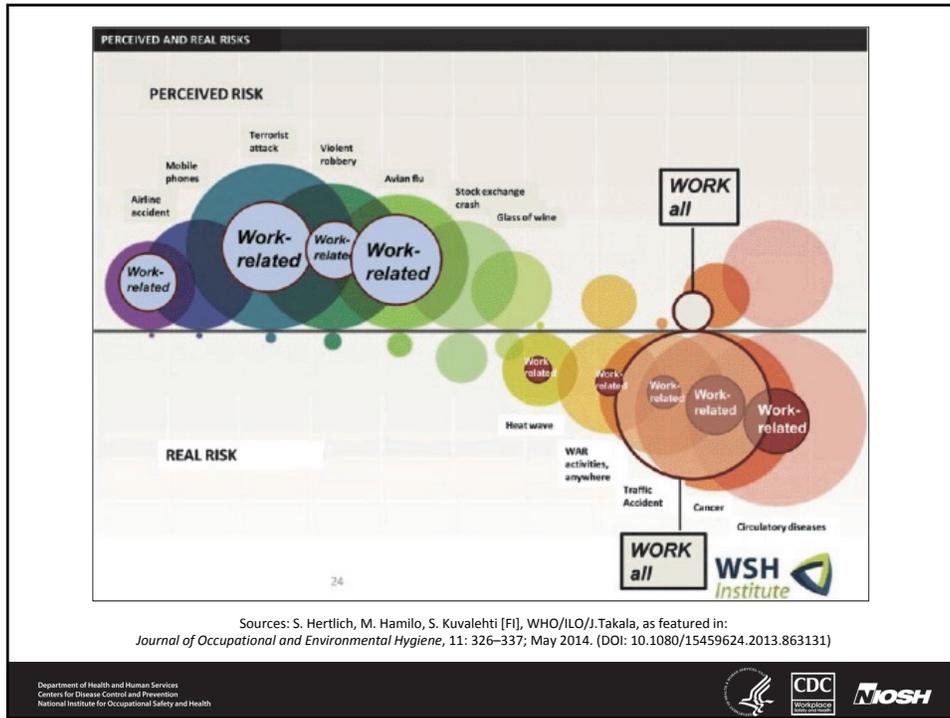


Where is the workplace?



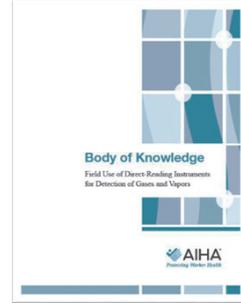
Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health





BoK Current Status

- SDS and Label Authoring
Core Team formed for REVISION.
- Business Case Development
JTA Survey in progress.
- DRI Field Use
- RPPA and Fit Testing
- IAQ Practitioner
- Exposure Assessment



DOWNLOAD a free copy!

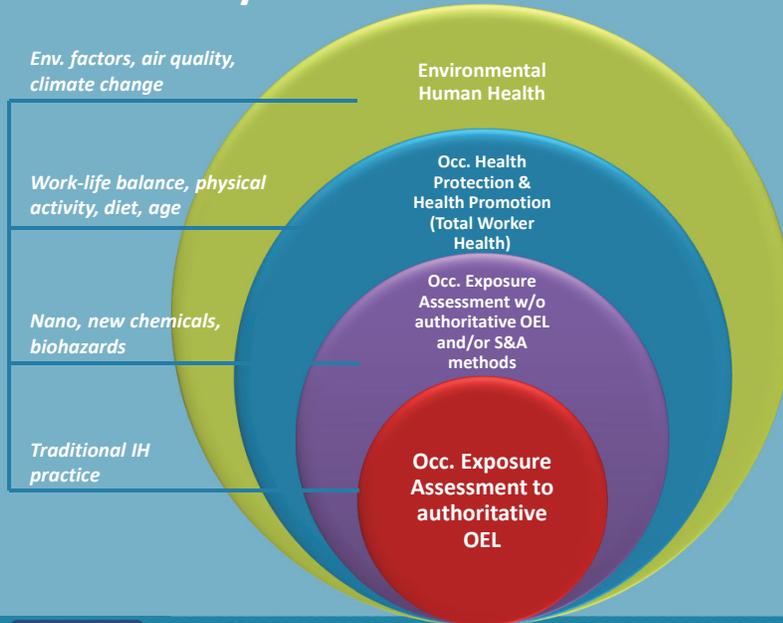
<https://www.aiha.org/education/BoKs/Pages/body-of-knowledge.aspx>



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Risk Territory of the IH



Protecting Worker Health

BoKs Planned for 2016

- Occupational Exposure Banding
 - Waiting on public review of expected NIOSH guideline document
- Risk Assessment
 - Next phase/expansion, building on the exposure assessment and other BoKs already completed

Risk Territory of the IH

Current BoK

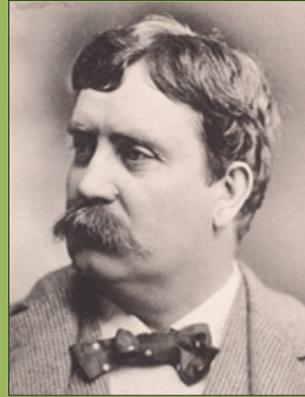


Future AIHA BoKs



How big and bold is our BoK vision?

Make no little plans;
they have no magic
to stir men's blood
and probably
themselves will not
be realized.



Daniel Burnham, Chicago Architect (1846 – 1912)

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Where do we as a profession want to have impact regarding the topic of risk?

