

Liberty Mutual Research Institute for Safety

# Can We Apply STAMP/STPA to Occupational Injuries?

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# Liberty Mutual Research Institute for Safety

*generating knowledge to help people live safer and more secure lives*



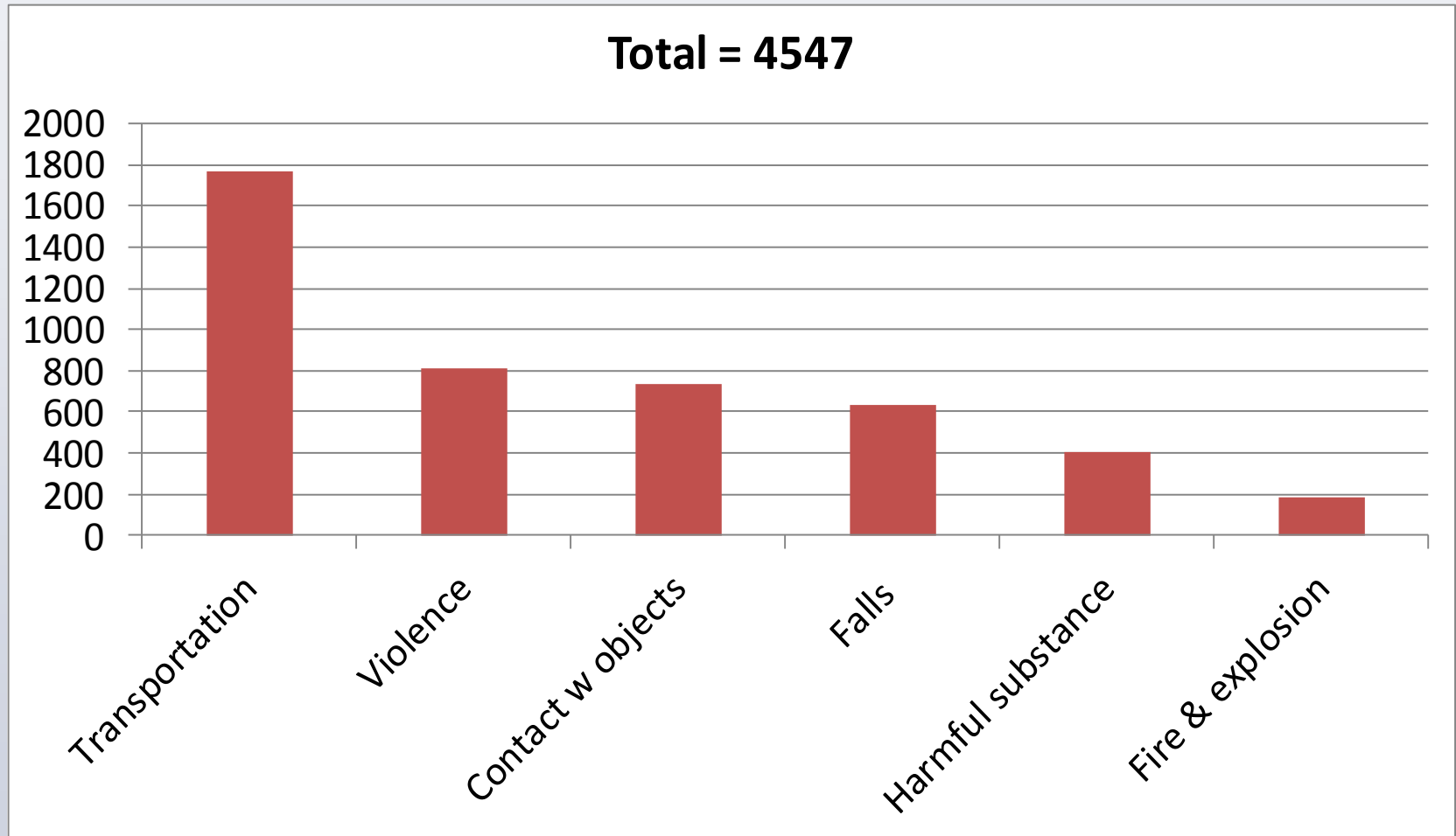
**Mission:**  
to advance scientific, business-relevant knowledge in workplace and highway safety, and work disability

- Center for Injury Epidemiology
- Center for Physical Ergonomics
- Center for Behavioral Sciences
- Center for Disability Research



# PROBLEM SPACE: OCCUPATIONAL INJURIES

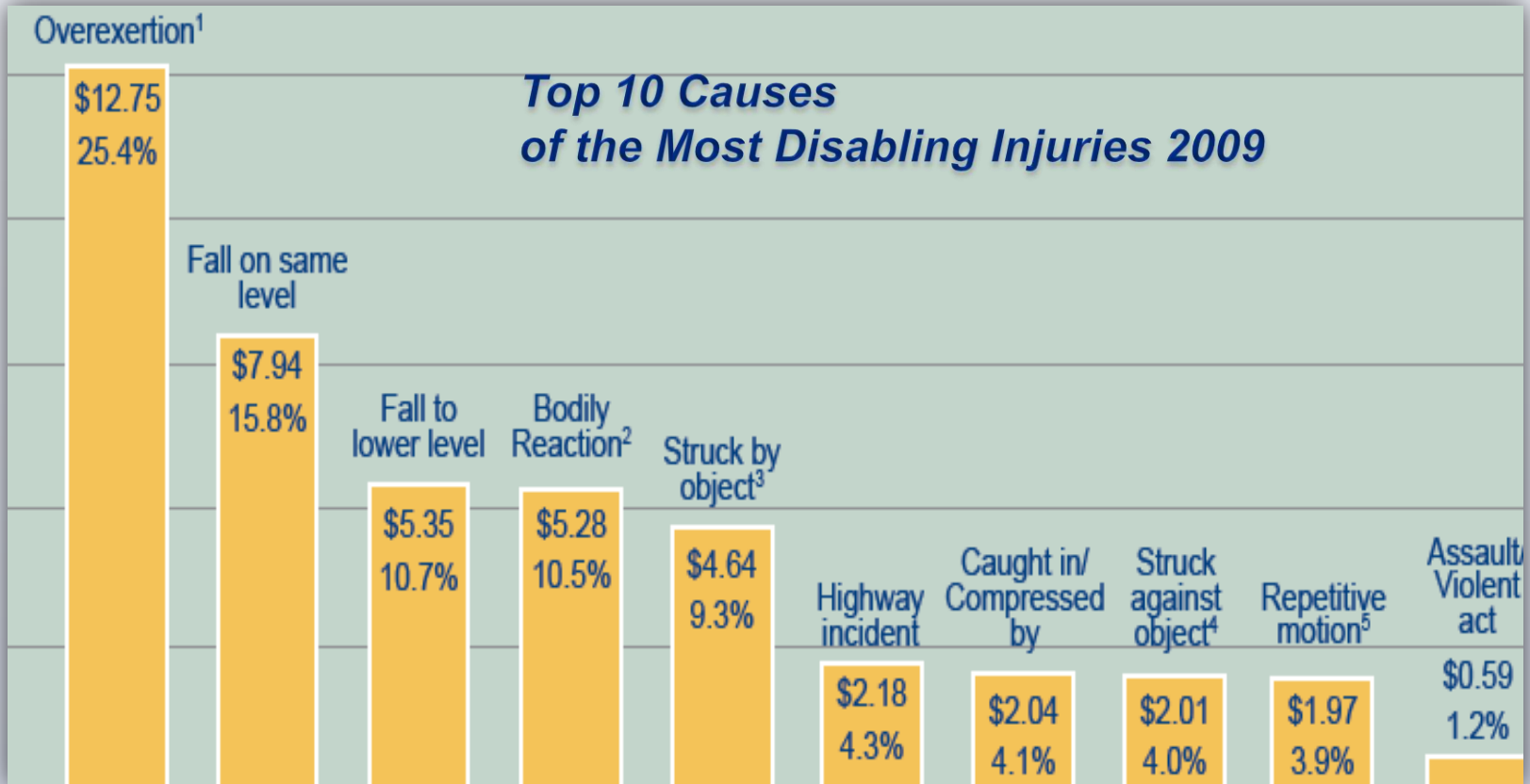
# U.S. Occupational Fatalities (2010)



Source: Bureau of Labor Statistics

# LM Workplace Safety Index 2011

Overall cost of severe injuries = **\$50 Billion**



<sup>1</sup>Overexertion – Injuries from excessive lifting, pushing, pulling, holding, carrying, throwing

<sup>2</sup>Bodily reaction – Injuries from bending, climbing, reaching, standing, sitting, slipping or tripping without falling

<sup>3</sup>Struck by object – Such as a tool falling on a worker from above

<sup>4</sup>Struck against object – Such as a worker walking into a door

<sup>5</sup>Repetitive motion – Injuries due to repeated stress or strain

# Examples of Occupational Injuries

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Overexertion



Falls from same level

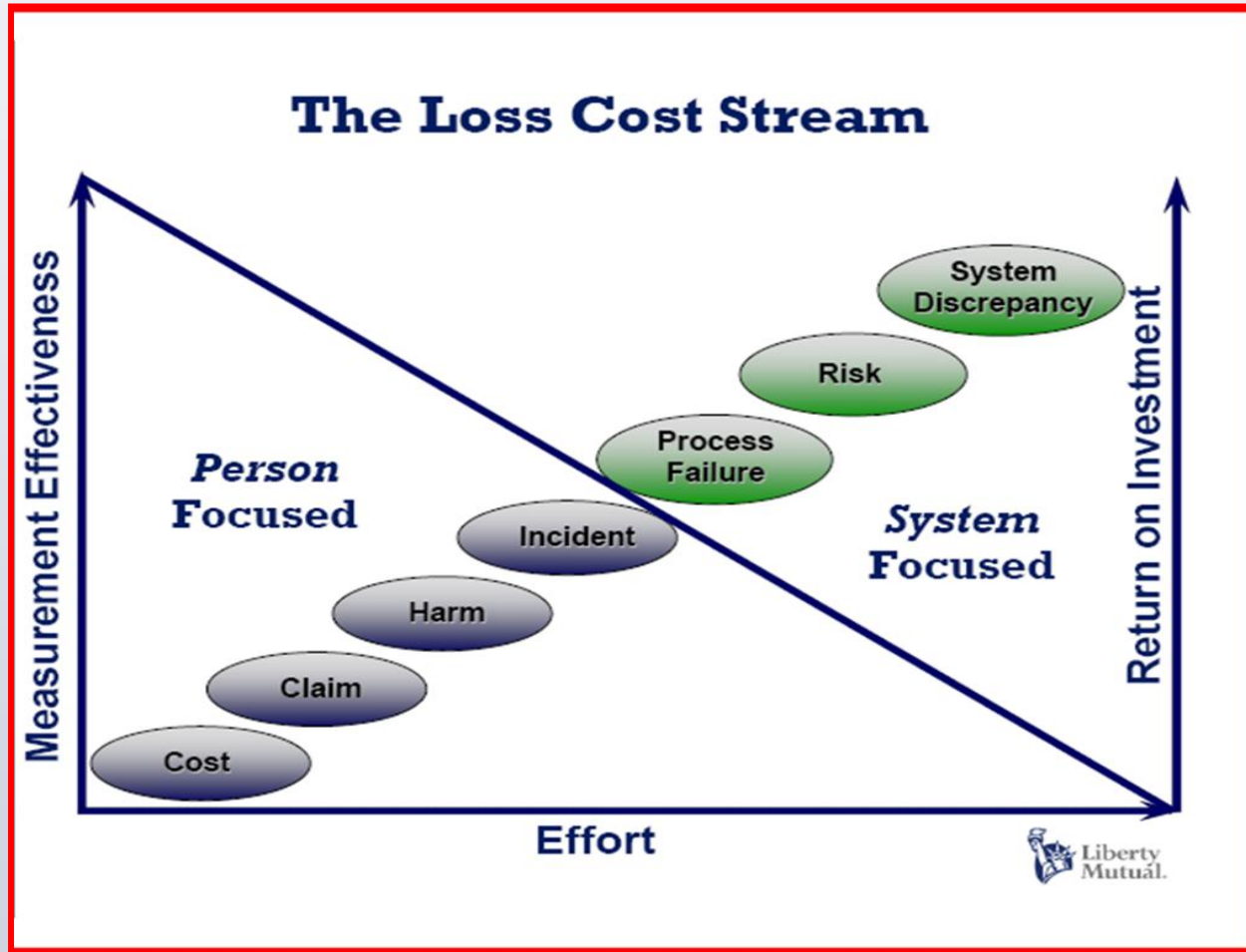
# Traditional Approaches toward Risk Reduction of Occupational Injuries

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- ◆ **Engineering** (e.g., redesigning a tool or installing machine guards);
- ◆ **Administrative** (e.g., changing job procedures or rotating workers through a particular job);
- ◆ **Personal Protective Equipment** (e.g., protective glasses or hearing protection);
- ◆ **Education and Training**

Recent realization, among safety professionals, that new approaches are required

# Loss Control Systems Approach: Changing the System Not the Person



Loss Control Advisory Service



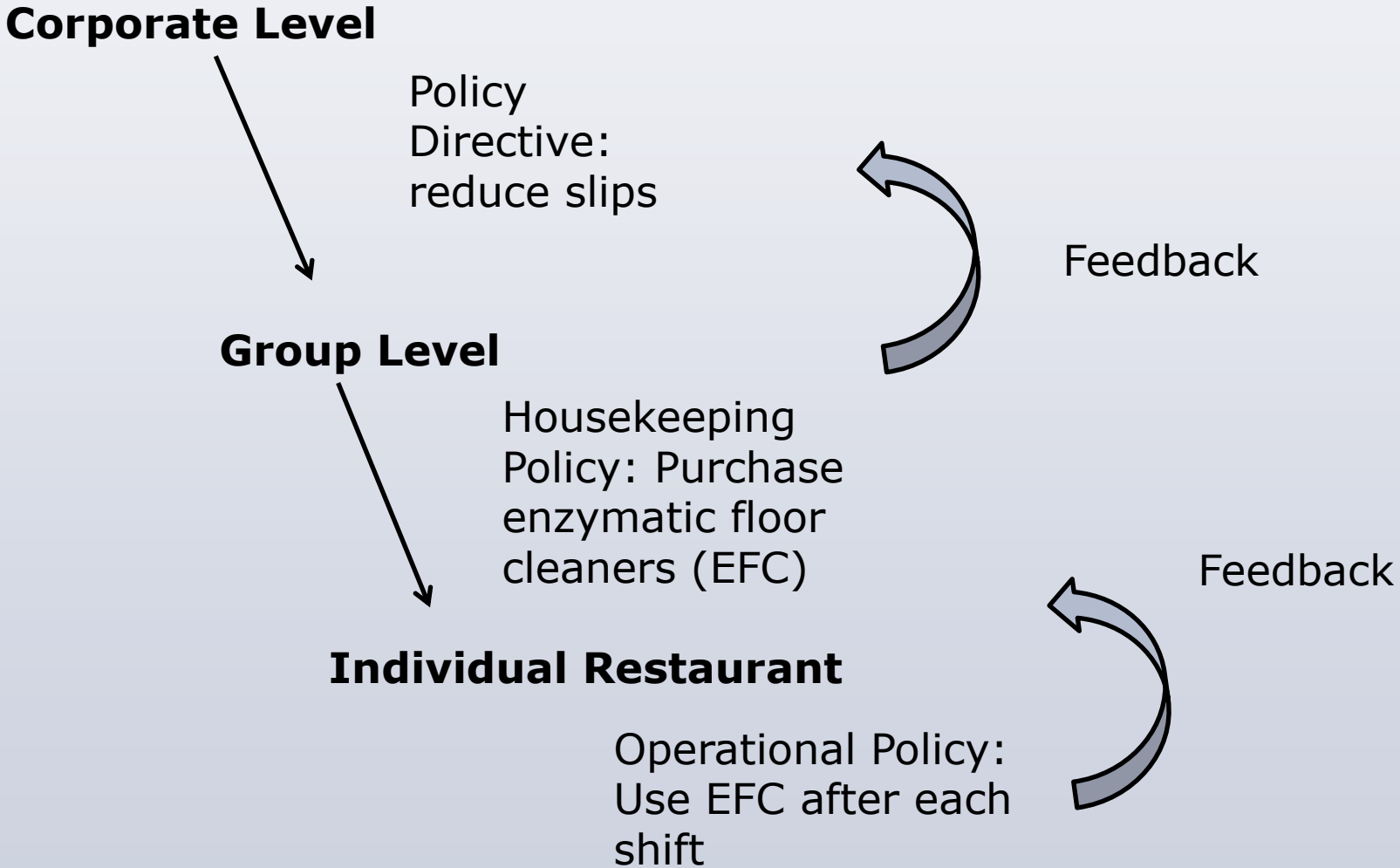
# POTENTIAL APPLICATION OF STAMP/STPA

# Slipping in Limited Service Restaurants

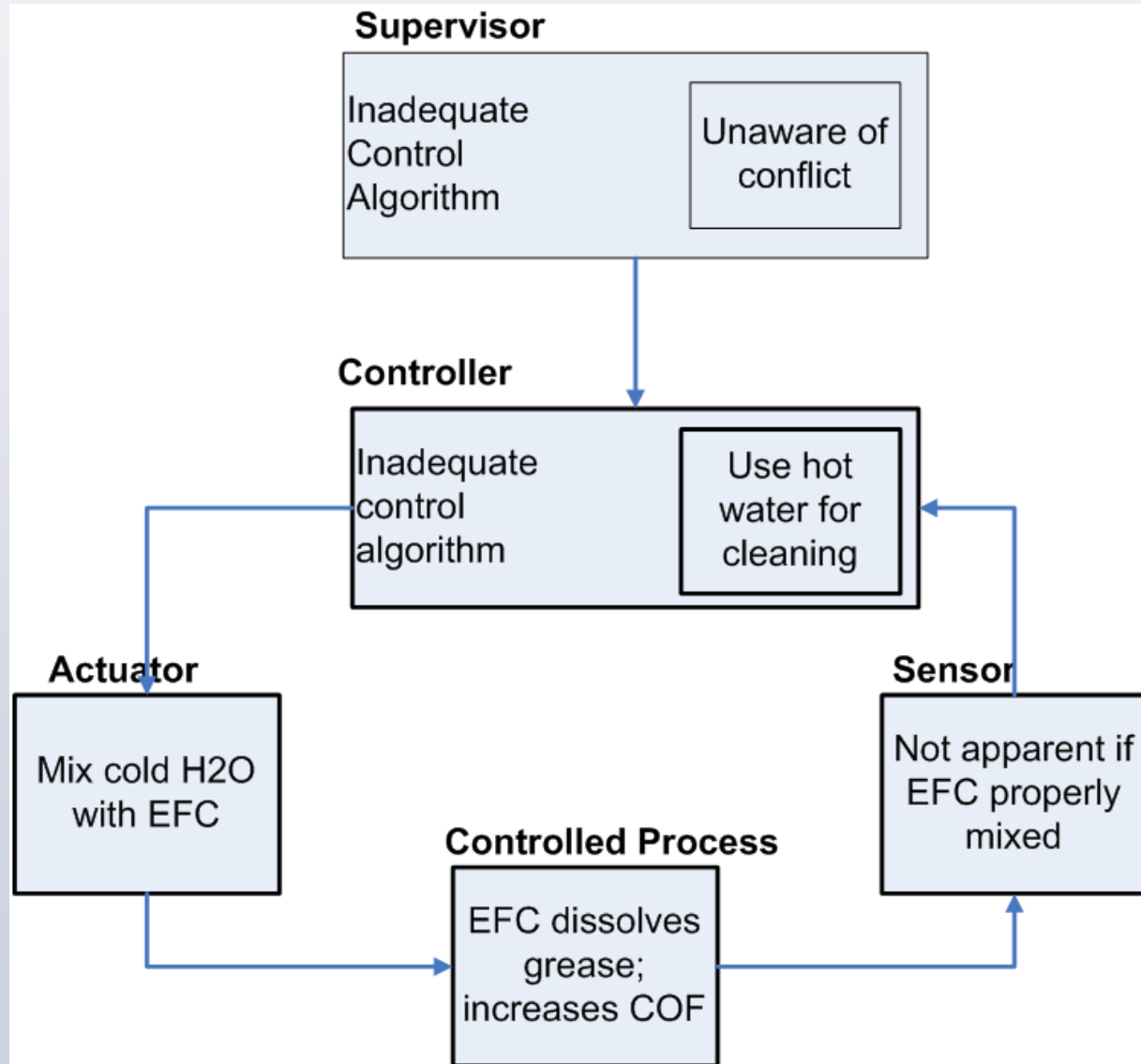
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- Food service/drinking establishments are
  - ◆ among largest employers in US (6.4%)
  - ◆ represent 3<sup>rd</sup> largest occupational injury burden (after specialty contractors and hospitals)
- Slips and falls account for one out of every three disabling restaurant injuries

# Oversimplified Approach to STAMP: Hierarchical Safety Control Structure



# Process Control Analysis: Cleaner





Step 2



Step 3



Step 4



## Begin in the Dining Room

- Sweep floor debris with broom into dust pan.

**NOTE:** Place "Wet Floor" cones in area to be mopped.

- Fill mop bucket with cold Floor Cleaner Solution.

**NOTE:** Do not use Hot water.

- Clean 1/2 of the Dining Room tile floor at a time.
  - Apply sufficient amount of Floor Cleaner Solution to 1/2 of the tile floor using a blue mop.
- NOTE:** Larger stores may need to clean tile floors 1/3 at a time.

- Scrub area with the blue deck brush, working the solution in the direction of the grout.

- Mop up soiled solution, using a figure "8" motion divided into three swipes not wider than

# STPA: Hazardous Control Actions

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- Grease on floor-> slippery condition
- Untrained/unsupervised cleaner renders EFC ineffective
- High turnover ->reduced effectiveness of cleaner training/supervision

Research findings from LMRIS:  
69% of limited service restaurants used EFC.  
However, 62% reported using hot water!

# Conclusions

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- Is STAMP/STPA scalable to occupational injury domains?
  - ◆ Example based on detailed series of epidemiological studies\*
  - ◆ Depth of information not typical for other industries

\*Verma SK, Chang WR, Courtney TK, Lombardi DA, Huang YH, Brennan MJ, Mittleman MA, Ware JH, Perry MJ. A prospective study of floor surface, shoes, floor cleaning and slipping in US limited-service restaurant workers. *Occup Environ Med.* 2011 Apr;68(4):279-85.

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