Can We Apply STAMP/STPA to Occupational Injuries?

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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

Total = 4547

Source: Bureau of Labor Statistics
Overall cost of severe injuries = **$50 Billion**

1. **Overexertion**
   - Fall on same level: $12.75 (25.4%)
   - Fall to lower level: $7.94 (15.8%)
   - Bodily Reaction: $5.35 (10.7%)
   - Struck by object: $5.28 (10.5%)

2. **Fall from level**
   - Highway incident: $4.64 (9.3%)
   - Caught in/Compressed by: $2.18 (4.3%)
   - Struck against object: $2.04 (4.1%)
   - Repetitive motion: $2.01 (4.0%)
   - Assault/Violent act: $1.97 (3.9%)

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1. Overexertion – Injuries from excessive lifting, pushing, pulling, holding, carrying, throwing
2. Bodily reaction – Injuries from bending, climbing, reaching, standing, sitting, slipping or tripping without falling
3. Struck by object – Such as a tool falling on a worker from above
4. Struck against object – Such as a worker walking into a door
5. Repetitive motion – Injuries due to repeated stress or strain
Examples of Occupational Injuries

Overexertion

Falls from same level
Traditional Approaches toward Risk Reduction of Occupational Injuries

- **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

The Loss Cost Stream

Person Focused

System Focused

Cost
Claim
Harm
Incident
Process Failure
Risk
System Discrepancy

Measurement Effectiveness

Effort

Return on Investment

Loss Control Advisory Service
POTENTIAL APPLICATION OF STAMP/STPA
Slipping in Limited Service Restaurants

- Food service/drinking establishments are
  - among largest employers in US (6.4%)
  - represent 3rd 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

**Corporate Level**
- Policy Directive: reduce slips

**Group Level**
- Housekeeping Policy: Purchase enzymatic floor cleaners (EFC)

**Individual Restaurant**
- Operational Policy: Use EFC after each shift

Feedback

Feedback
Process Control Analysis: Cleaner

**Supervisor**

- Inadequate Control Algorithm
  - Unaware of conflict

**Controller**

- Inadequate control algorithm
  - Use hot water for cleaning

**Actuator**

- Mix cold H2O with EFC

**Sensor**

- Not apparent if EFC properly mixed

**Controlled Process**

- EFC dissolves grease; increases COF
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 swings not wider than 1/3 of the tile.
STPA: Hazardous Control Actions

- 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

Is STAMP/STPA scalable to occupational injury domains?

- Example based on detailed series of epidemiological studies*
- Depth of information not typical for other industries

Generating knowledge to help people live safer, more secure lives.

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