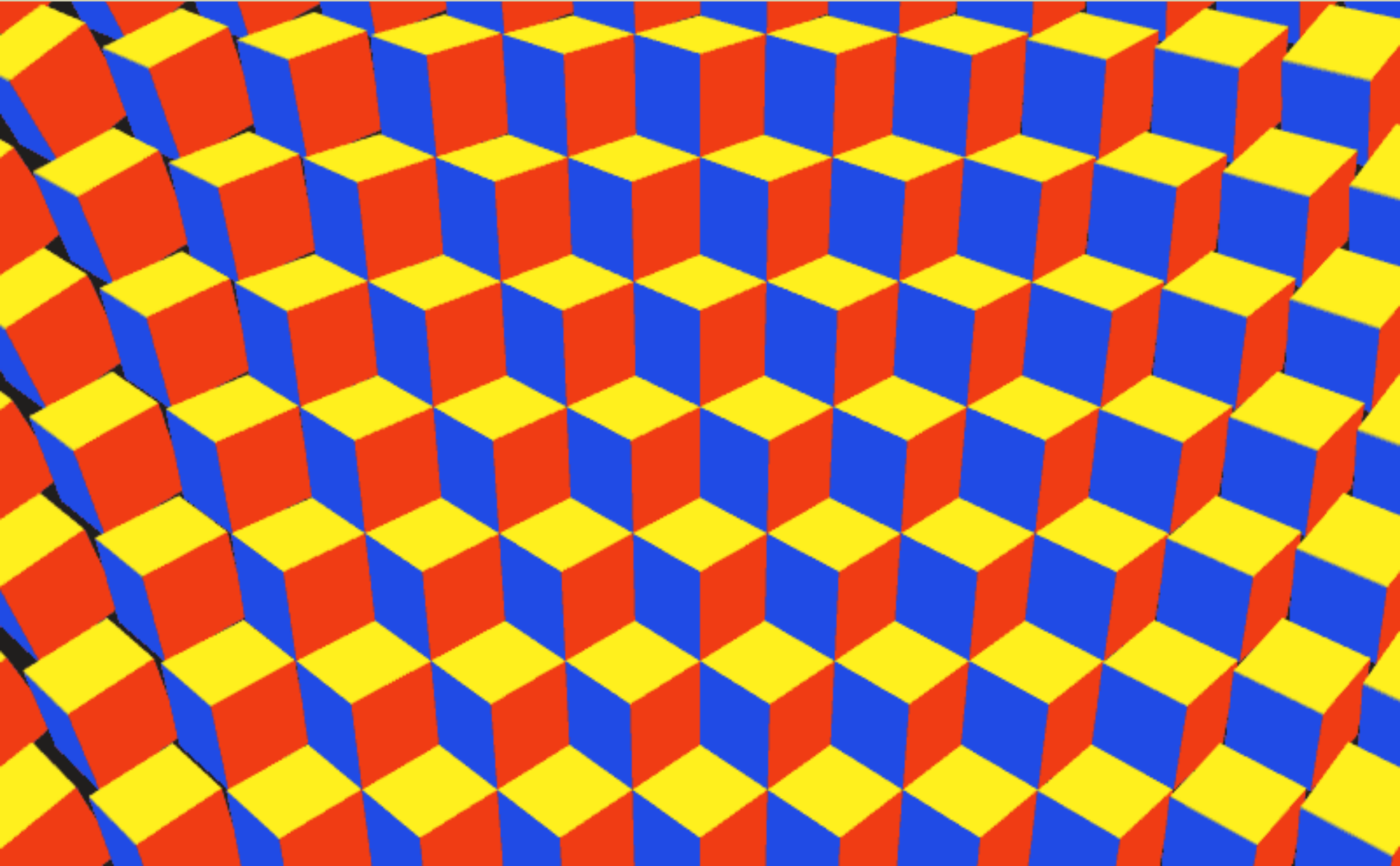
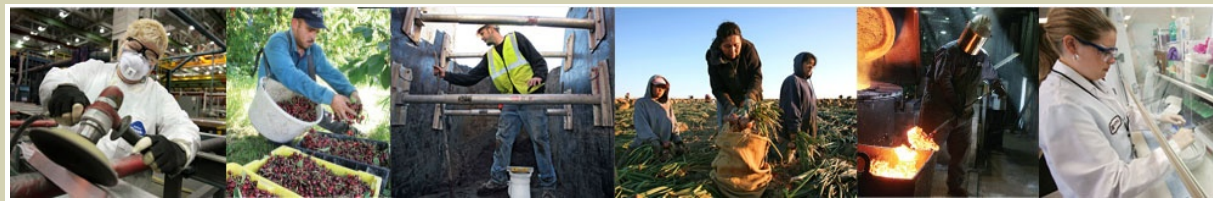




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The Interface



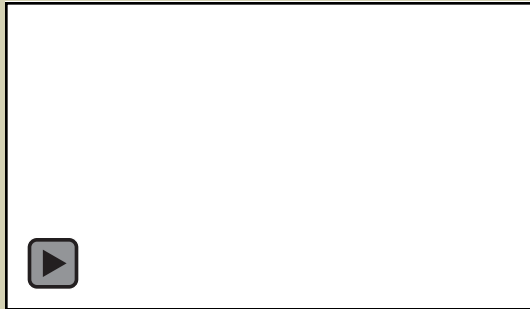


Washington State Department of
Labor & Industries
Division of Occupational Safety and Health

Voluntary Protection Program

*Recognition of
Safety Excellence*

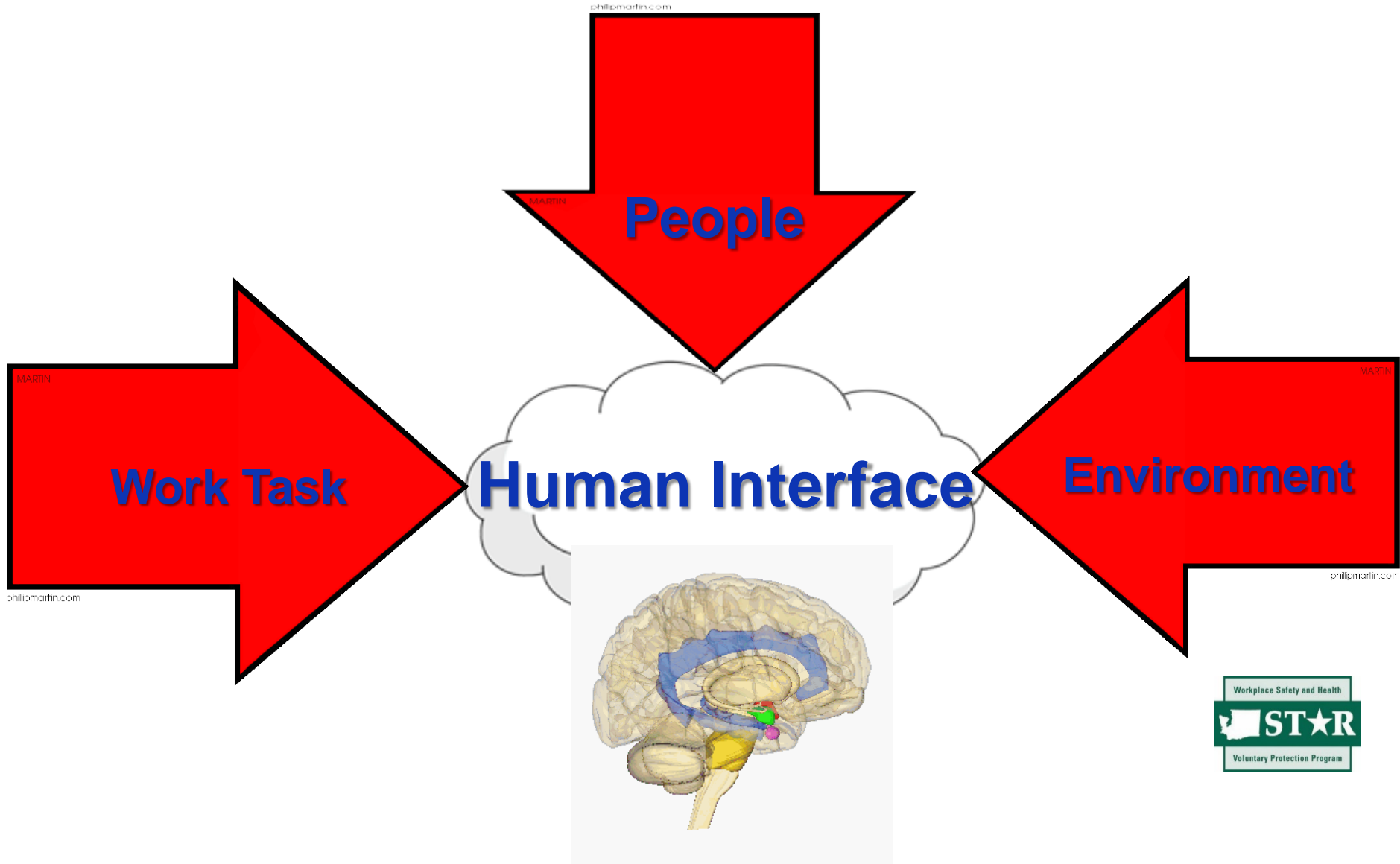
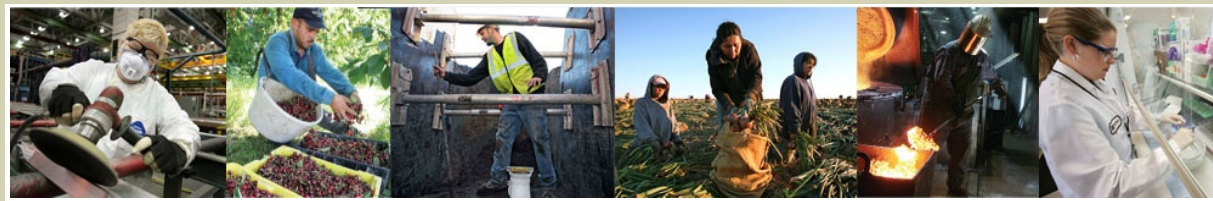
Why Do We have Mishaps?



Workplace Safety and Health

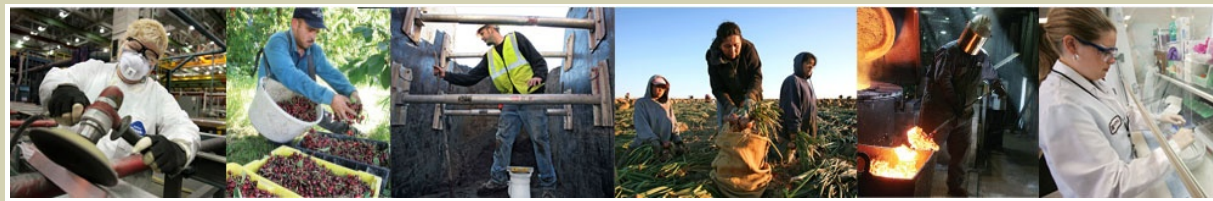


Voluntary Protection Program

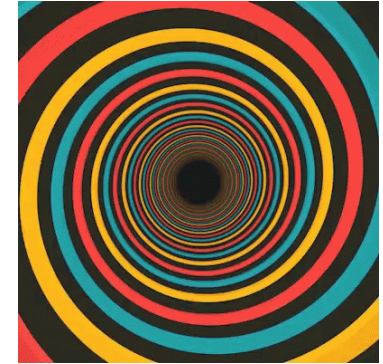




Washington State Department of
Labor & Industries

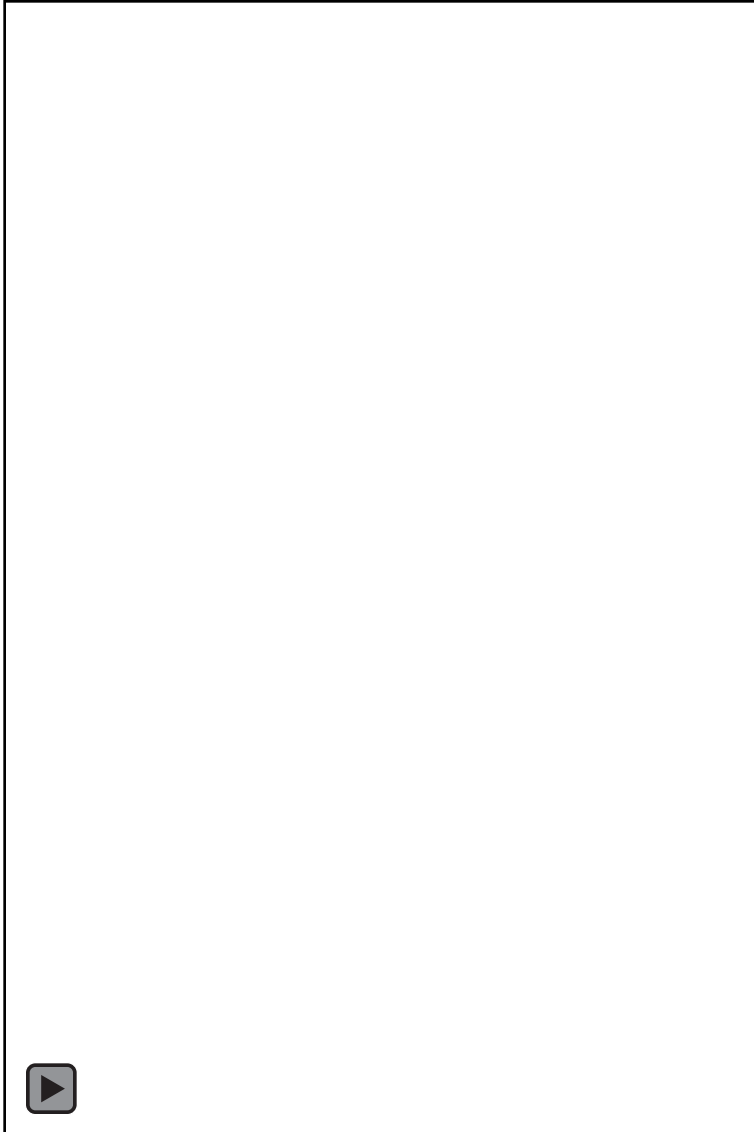
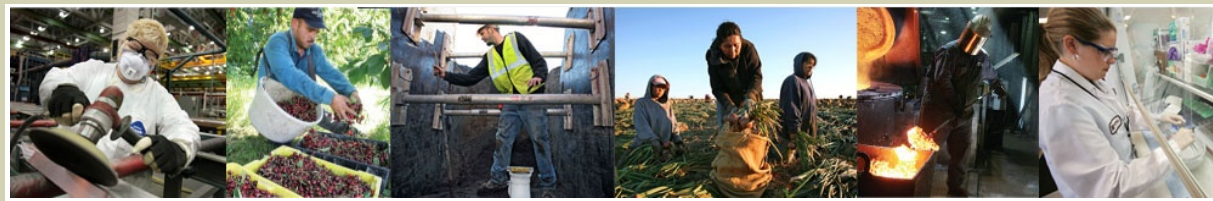


John Geppert
(360) 902-5496
gepp235@lni.wa.gov



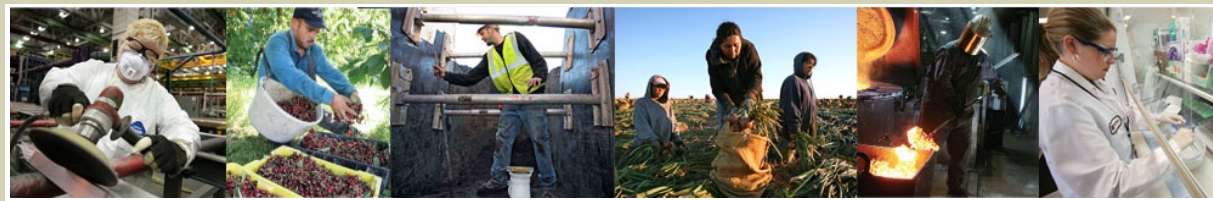
Cooperative and Outreach Programs Manager
Education and Outreach Services
Department of Labor & Industries
Division of Occupational Safety & Health (DOSH)





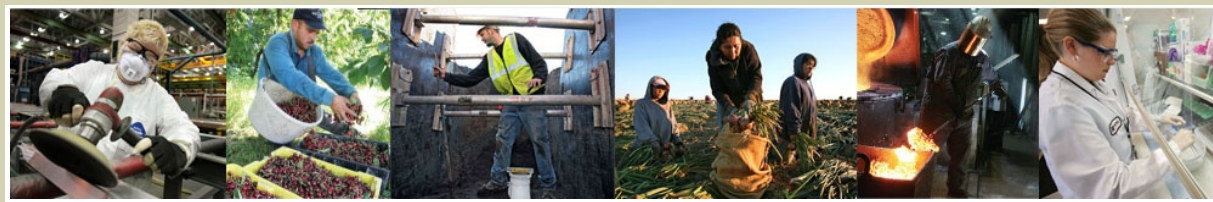


Washington State Department of
Labor & Industries

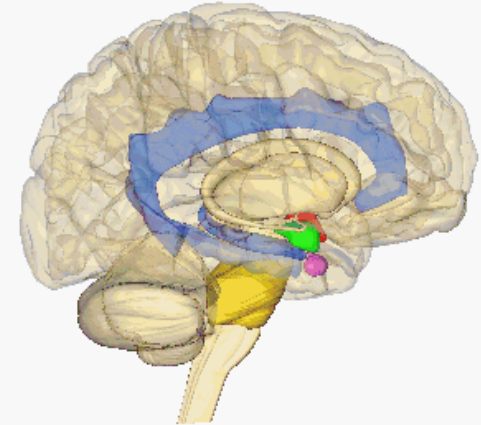


Human Behavior

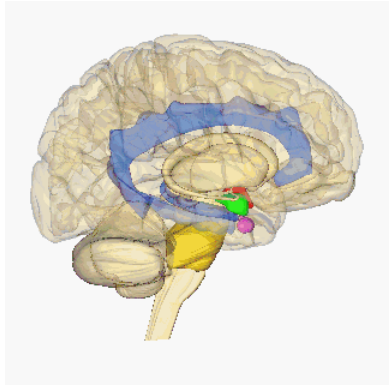
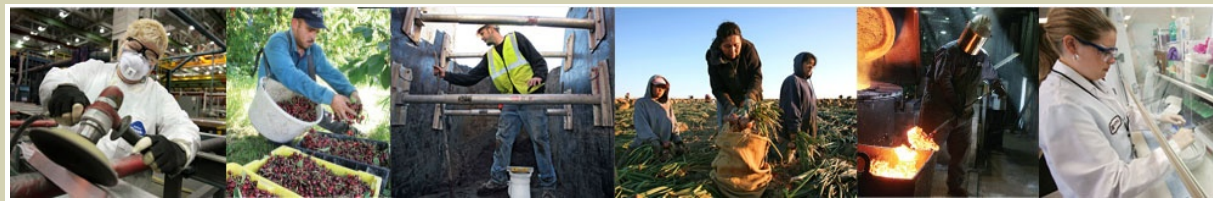




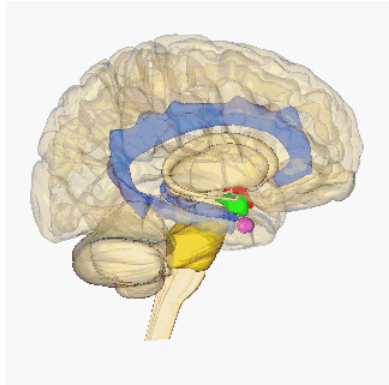
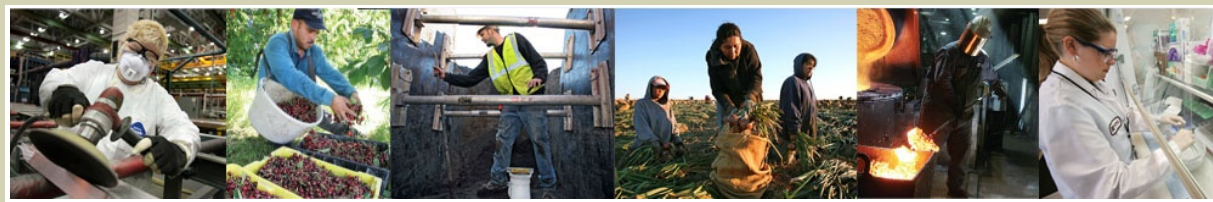
Objectives



- **You will explore the human task interface**
- **Know the importance of human factors in safety**
- **Understand your cognitive limitations in the workplace.**

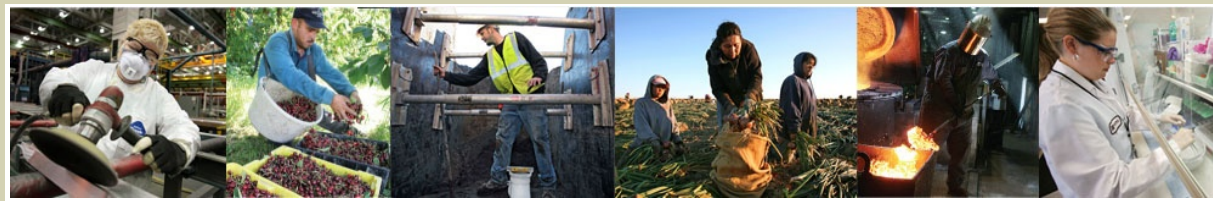


Why do we get injured in the workplace?

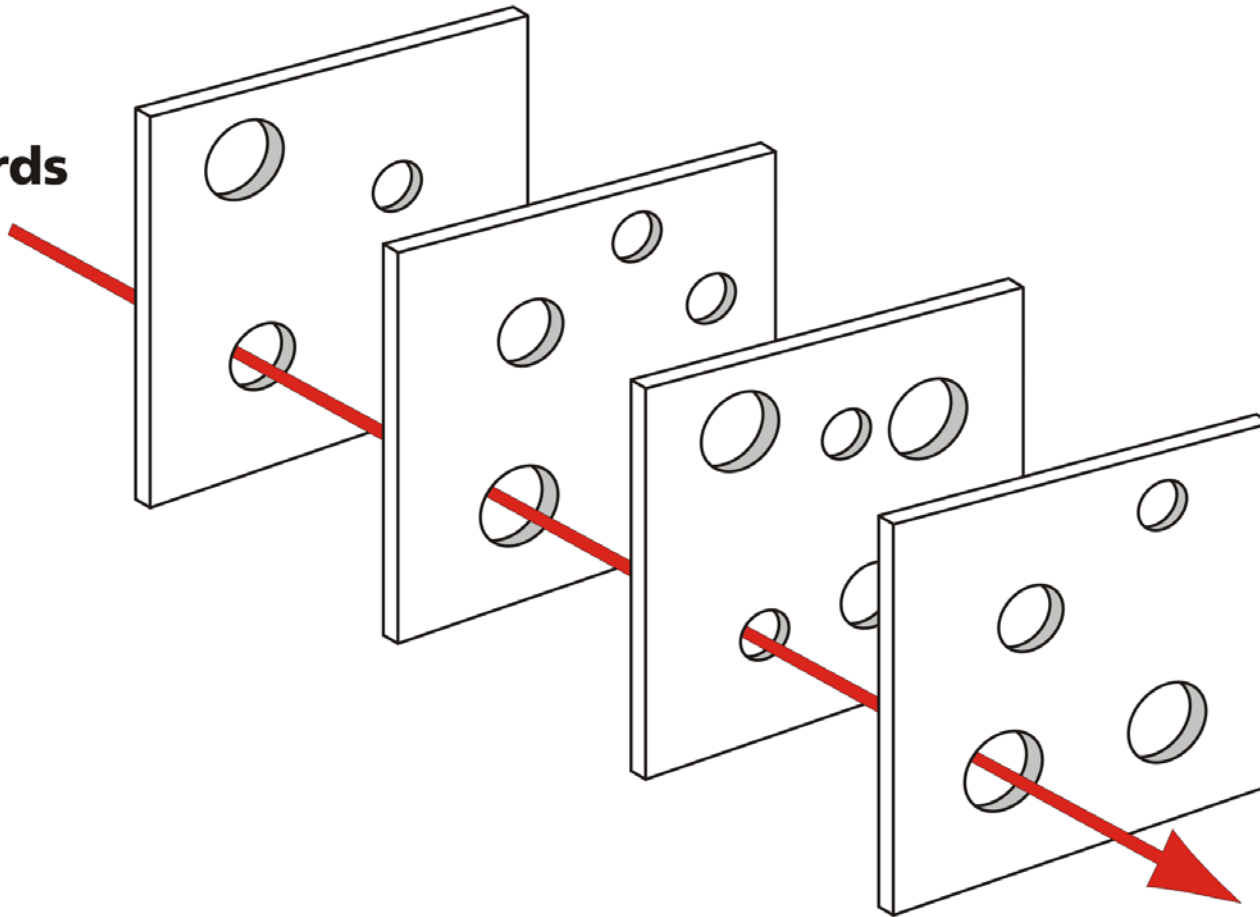


Possible Reasons

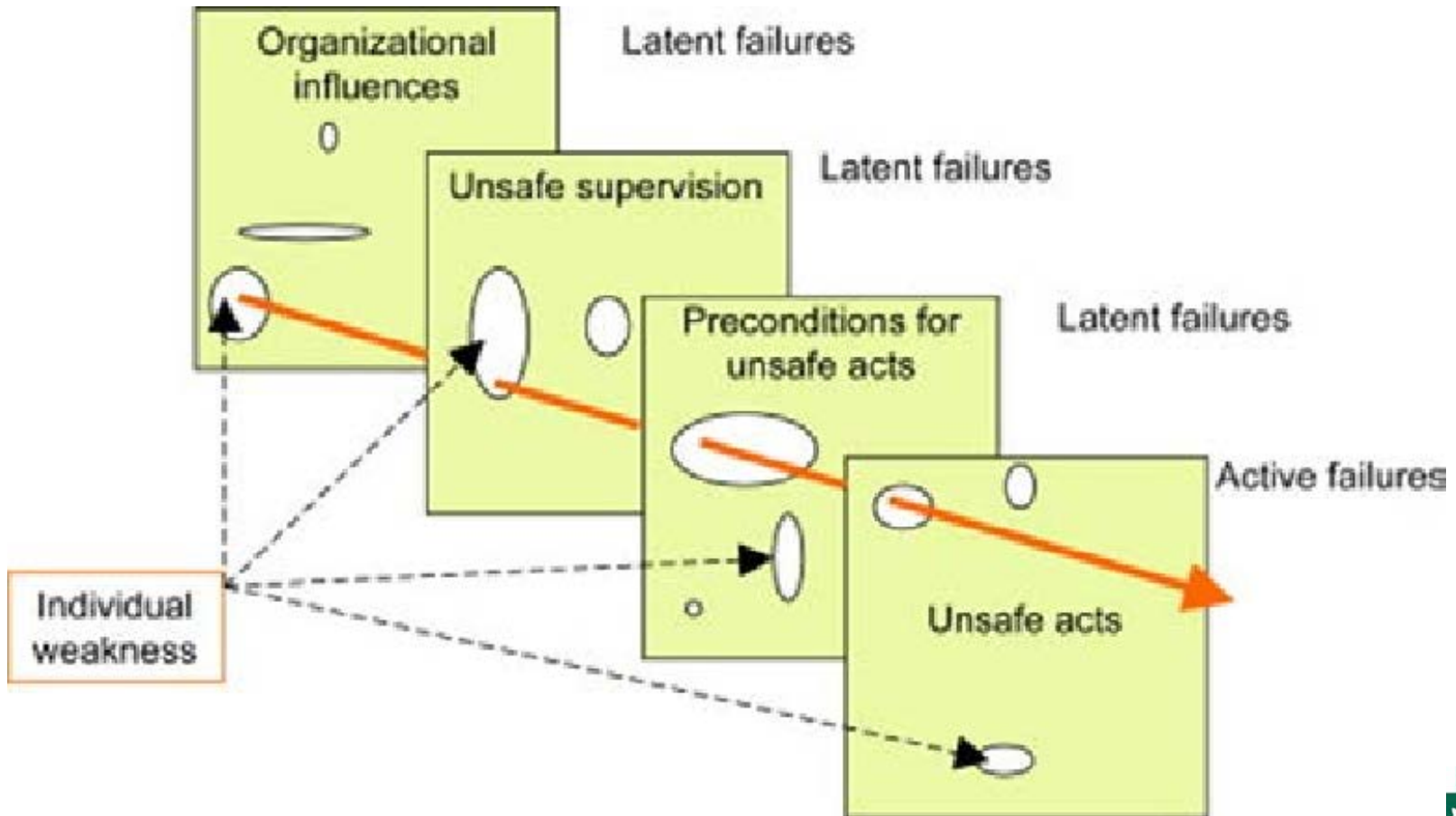
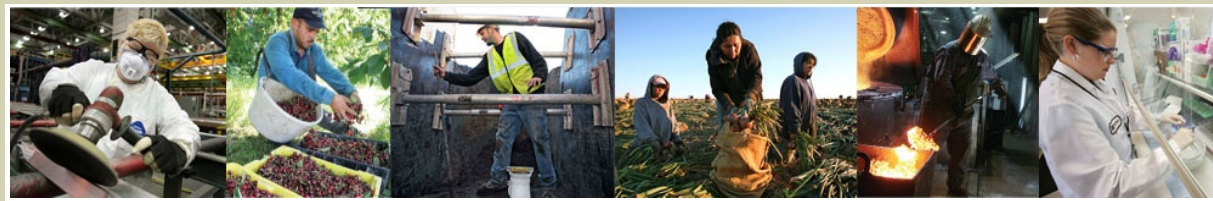
- You are exposed to hazards in the workplace.
- There is risk of injury and illness when you interface with work equipment or task.
- Workplace conditions or the environment changes
- Equipment or systems can fail

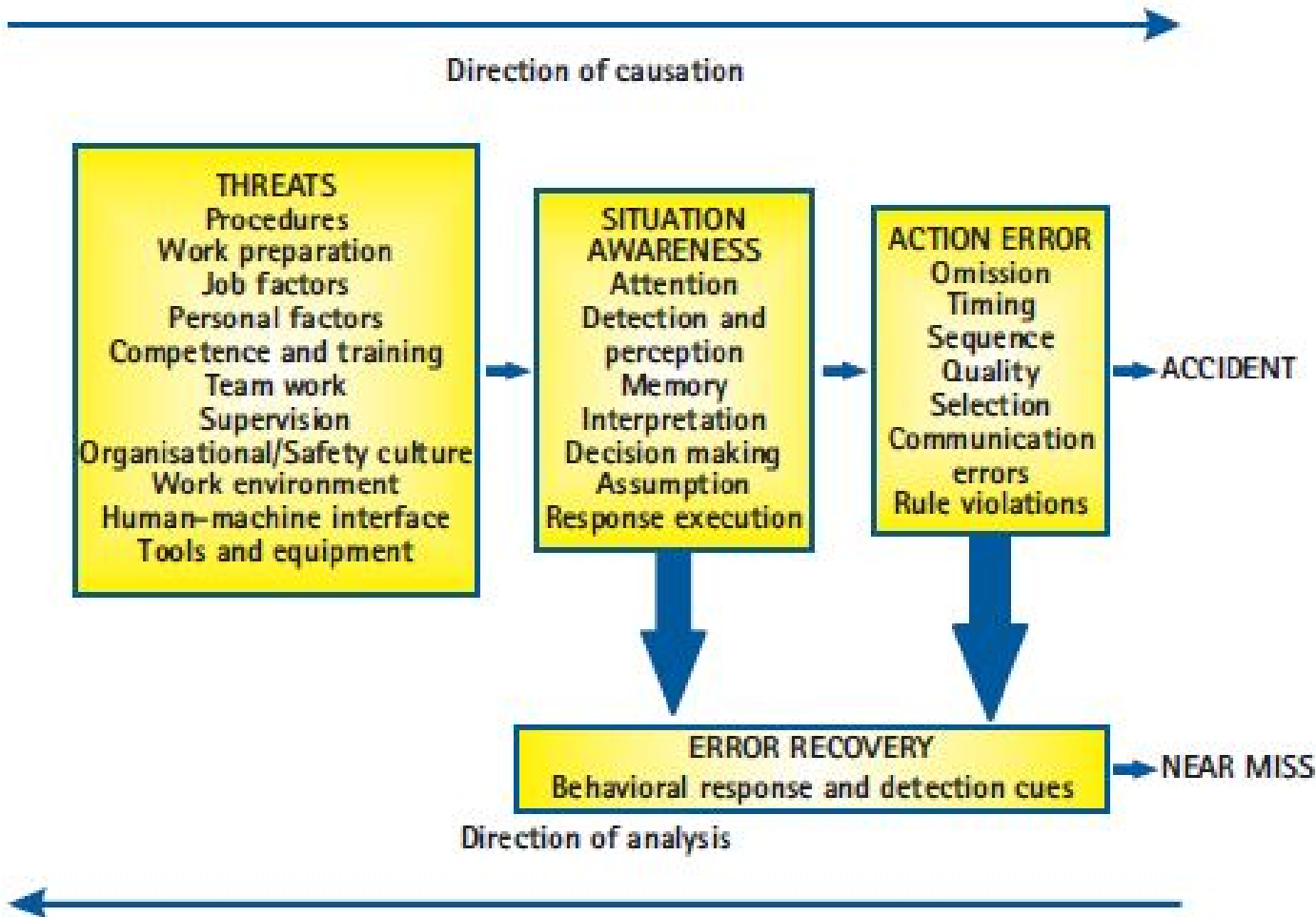
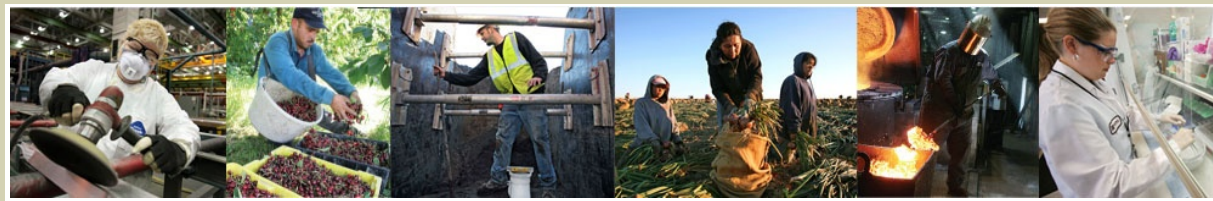


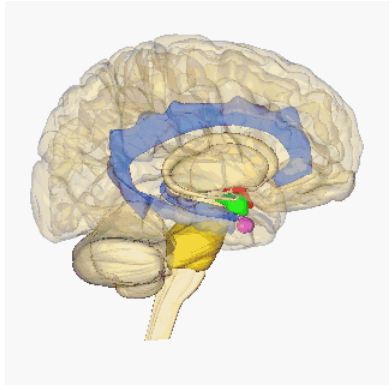
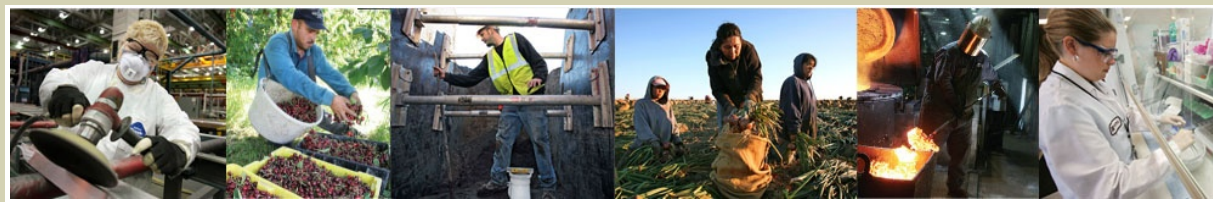
Hazards



Losses





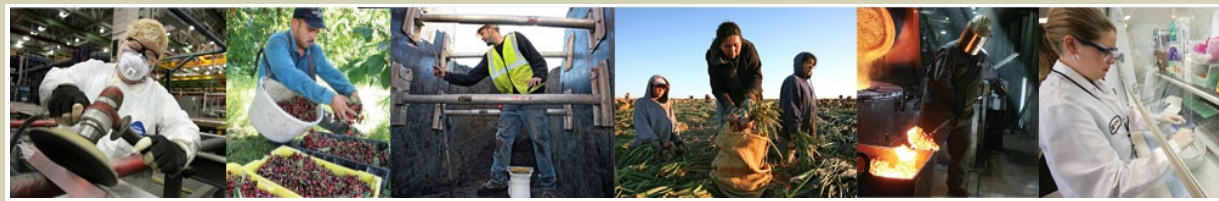


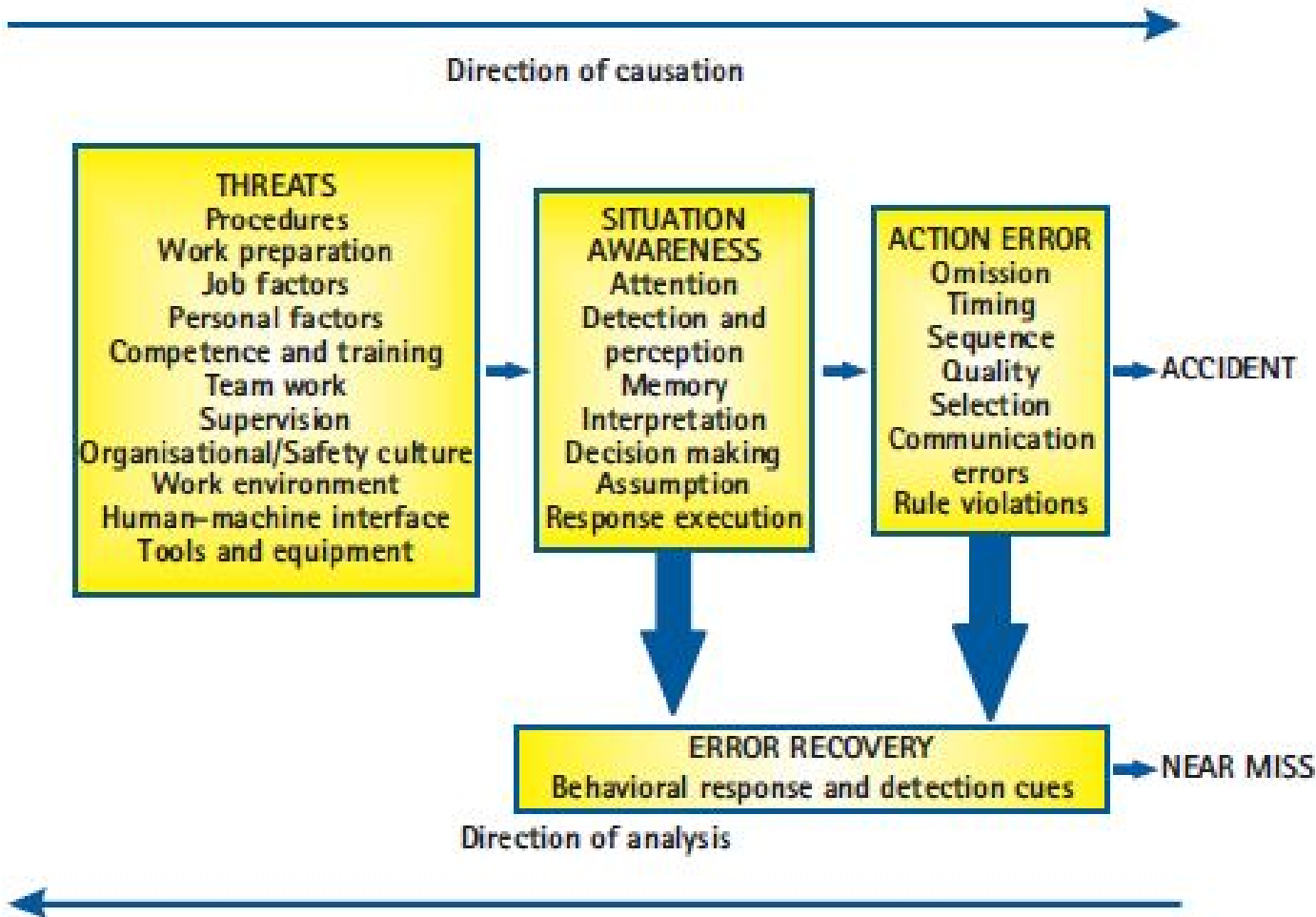
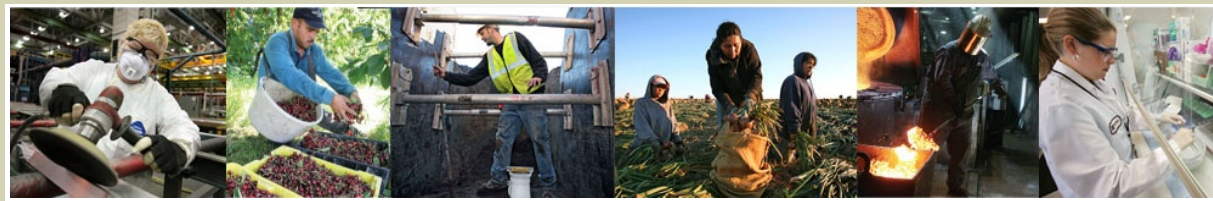
Five Most Common Incidents

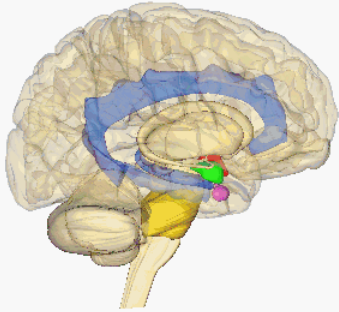
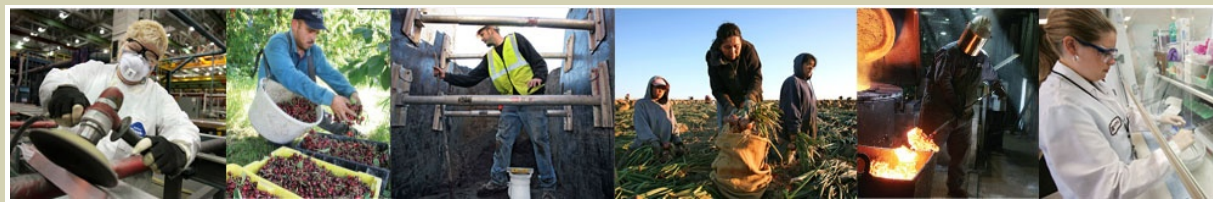
- **Slips trips, and falls.**
- **Being Caught In or Struck by Moving Machinery.**
- **Transportation and Vehicle-Related Accidents.**
- **Fire and Explosions**
- **Overexertion and Repetitive Stress Injuries**



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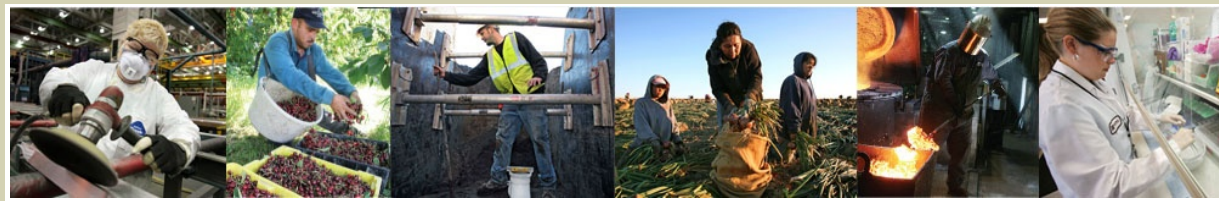


Seven Most Common Causes

- **Workers take shortcuts at work**
- **Workers are overconfidence.**
- **Inadequate Housekeeping.**
- **Starting a tasks before getting all necessary information**
- **Neglecting safety procedures and rules**
- **Mental Distraction**
- **Lack of Preparation**



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Big Picture on Causation

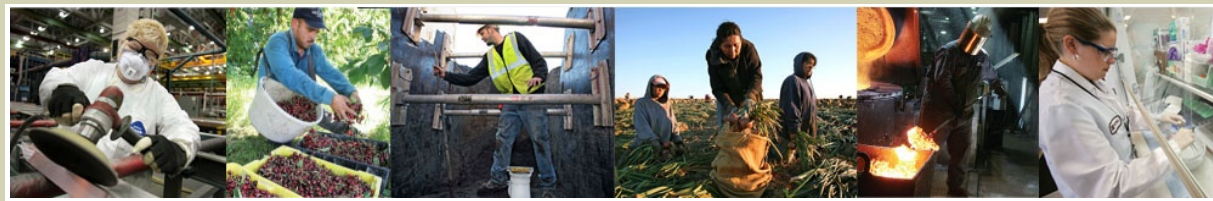
Workplace Safety and Health



Voluntary Protection Program



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Enviromental Factors

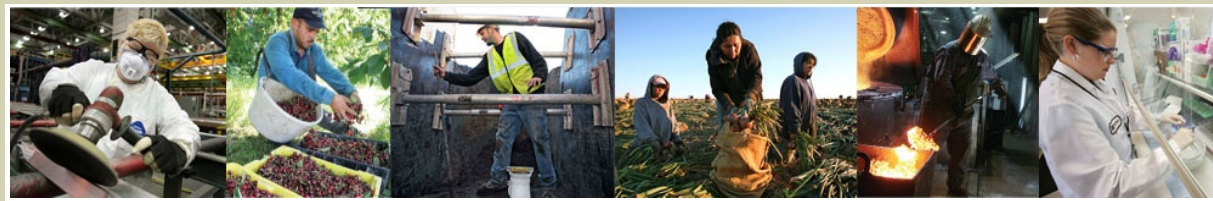
Equipment Configuration

Human Factors

Workplace Safety and Health



Voluntary Protection Program



Human factors considerations for industrial designers.

Warehouse Worker Crushed by Forks of Laser Guided Vehicle

INCIDENT FACTS

REPORT #: 71-171-2018s

REPORT DATE: 5/10/2018

INCIDENT DATE: 12/9/2015

VICTIM: 45 years old

Employed at facility for approximately one year

INDUSTRY: Bottled water manufacturing

OCCUPATION: Warehouse dock coordinator

SCENE: Water bottling plant warehouse

EVENT TYPE: Crush



FATALITY NARRATIVE



Photo of the automatic laser guided vehicle (LGV) involved in the incident.

The victim was working in the warehouse when an LGV alarm was activated. Shortly after, another worker heard noises over the radio and looked into the warehouse to investigate.

He saw the victim slumped over one of the LGVs. The LGV then started moving again, and the other worker hurried to it and initiated an emergency stop. He could see that the victim had severe injuries to his chest and jaw.

He called for help and called 911. Emergency responders arrived within minutes and transported the victim to a local hospital where he was pronounced dead.

FATALITY NARRATIVE



Example of a plastic “stringer” that would often tear off of the wrapping around the pallets of water bottles during loading and unloading and become caught on LGV forks. Stringers hanging from the forks that entered an LGV’s safety detection field would trigger an alarm and pause automatic movement.

The manufacturer's manual required workers to initiate an emergency stop before removing an obstacle detected by the LGV. An LGV would then have to be manually reset before restarting its task. Without initiating an emergency stop, the LGVs would resume automatic function immediately after an obstruction was removed.

There were warning signs affixed to the vehicle indicating that workers should avoid standing beneath the elevated forks.



Sticker on the LGV indicating that working underneath elevated forks was prohibited.

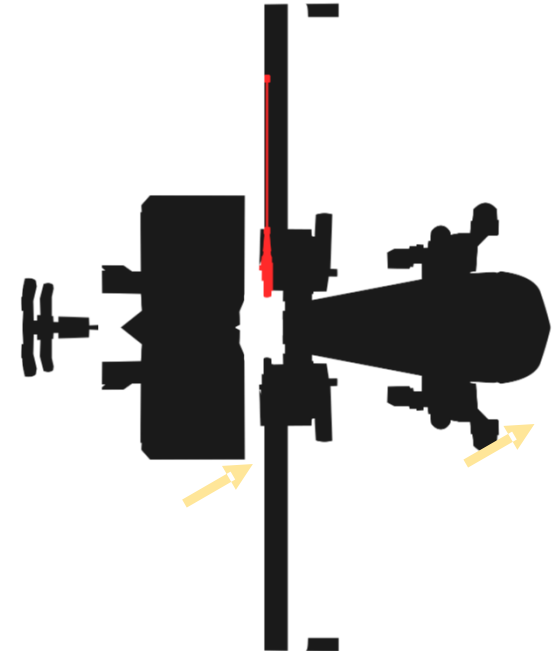


Diagram indicating the location of the emergency stop button and rope pull. An identical set was present on the other side of the LGV.



After the incident, the company trained employees to initiate an emergency stop before clearing an obstacle from an LGV's path, and to use a long-handled snipping tool to remove plastic stringers instead of reaching or bending under the forks of the LGV.

Requirements

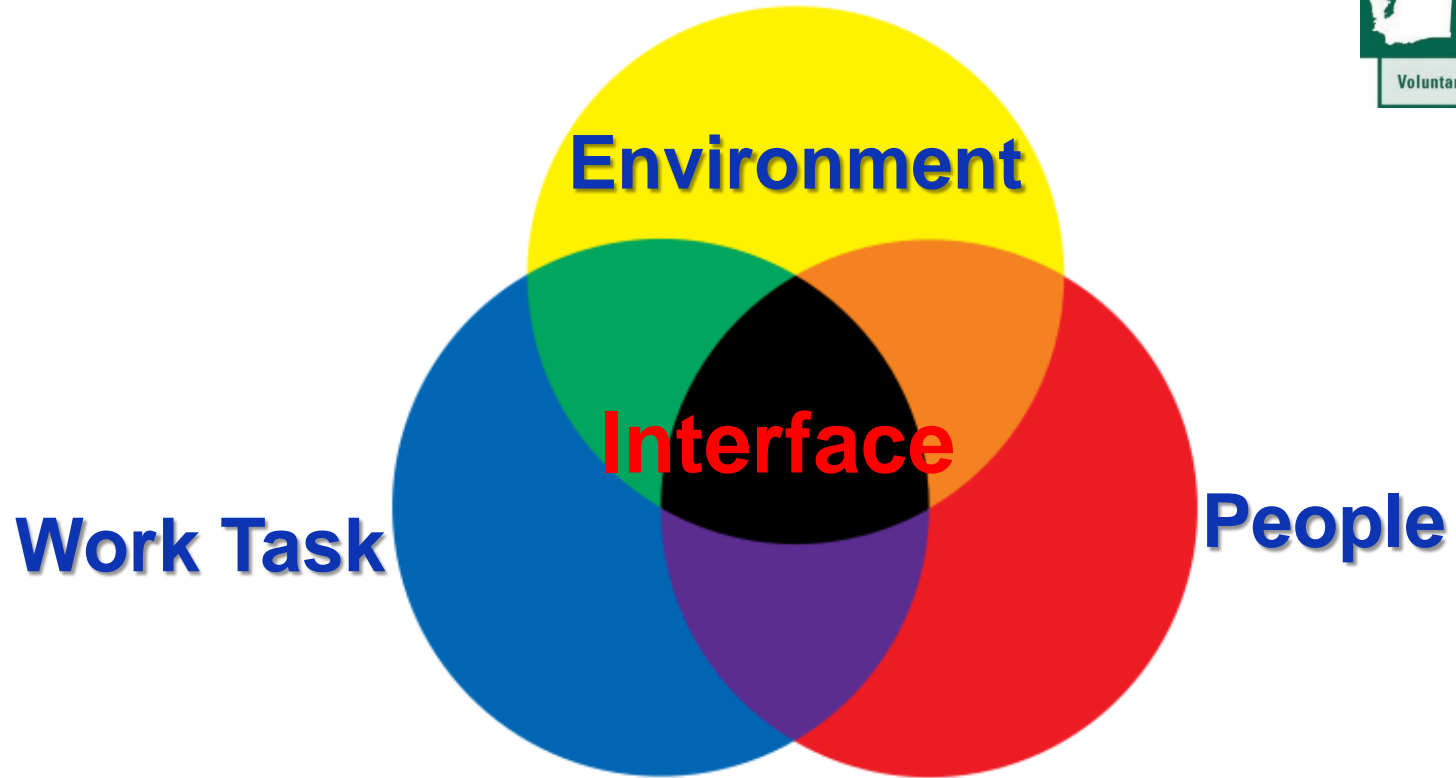
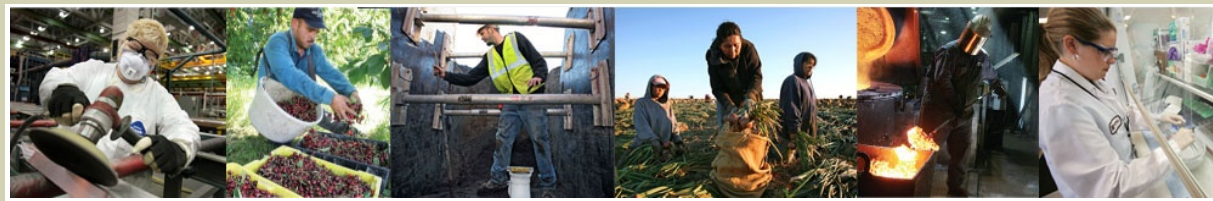
Employers must protect workers around PITs (powered industrial trucks), and not allow them under the elevated part of any PIT, whether it is loaded or empty.

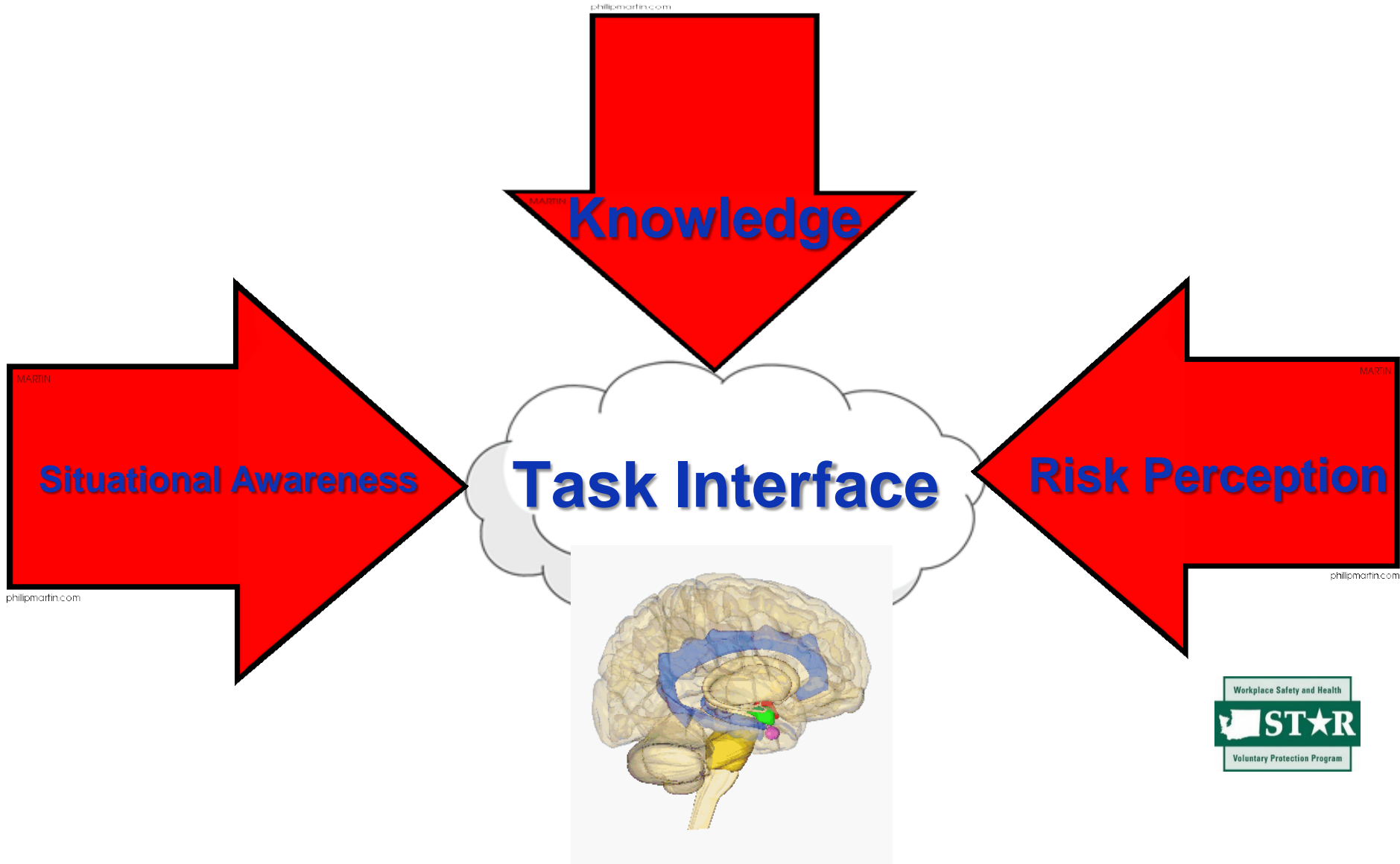
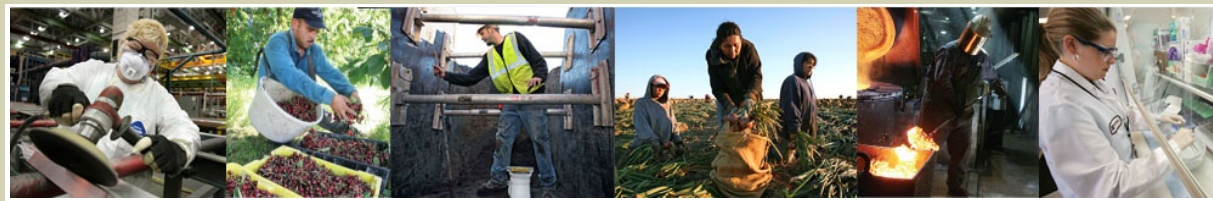
See [WAC 296-863-4005\(2\)\(a\)](#).

Recommendations

FACE investigators concluded that, to help prevent similar occurrences, employers should:

Train workers about the specific hazards associated with automated guided industrial vehicles, like LGVs. Emphasize that workers are expected to follow required safety procedures every time, and ensure compliance through periodic refresher training and spot checks.

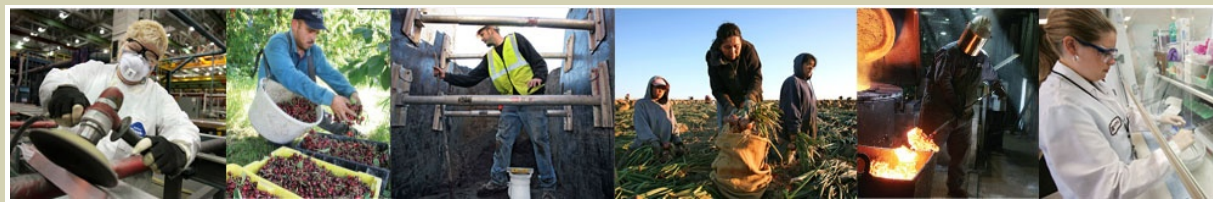




FATALITY NARRATIVE

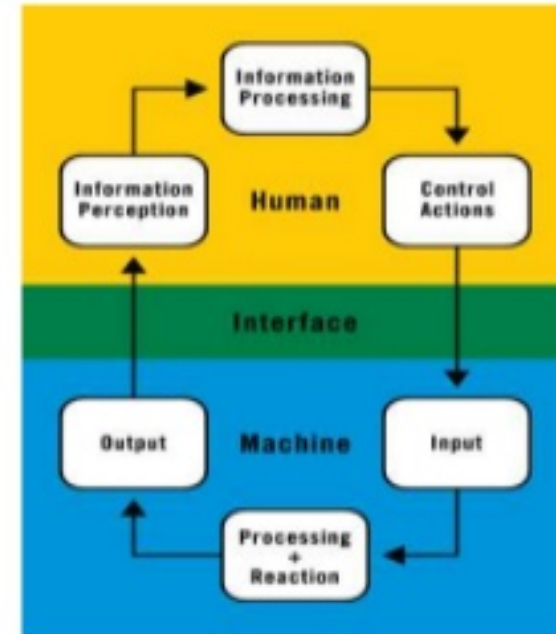


Photo of the automatic laser guided vehicle (LGV) involved in the incident.

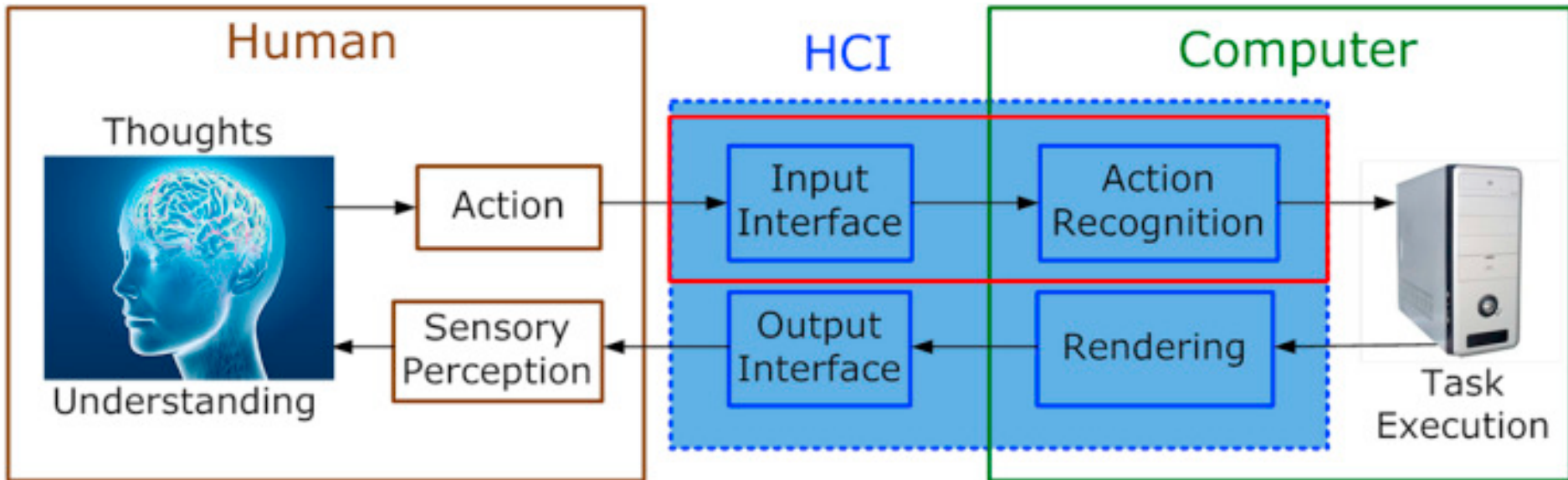
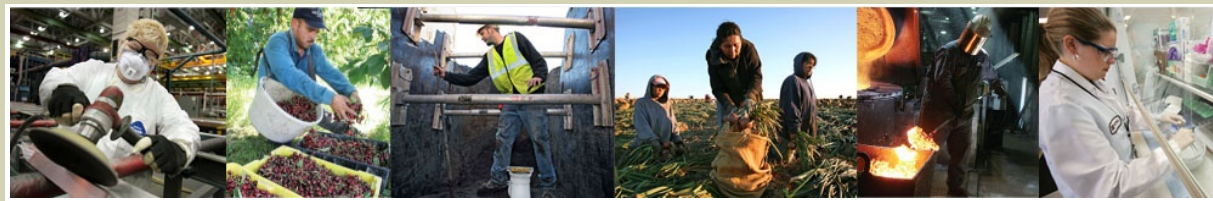


Causes of **USE ERRORS**

- **Perception**
 - Failure to see or hear information
- **Cognition (Processing)**
 - Forget information or step
 - Forget or apply rule incorrectly
 - Misinterpret information
- **Action**
 - Inability to reach a control
 - Use incorrect control
 - Use a control incorrectly
 - Failure to activate control

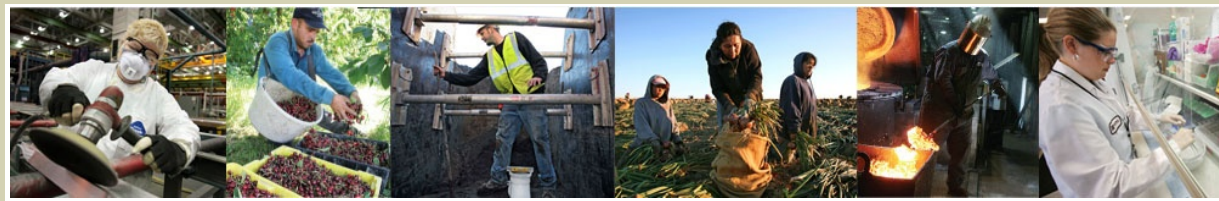


Source: FDA Draft Guidance: Applying Human Factors and Usability Engineering to Optimize Medical Device Design, 2011





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Cognitive Capture

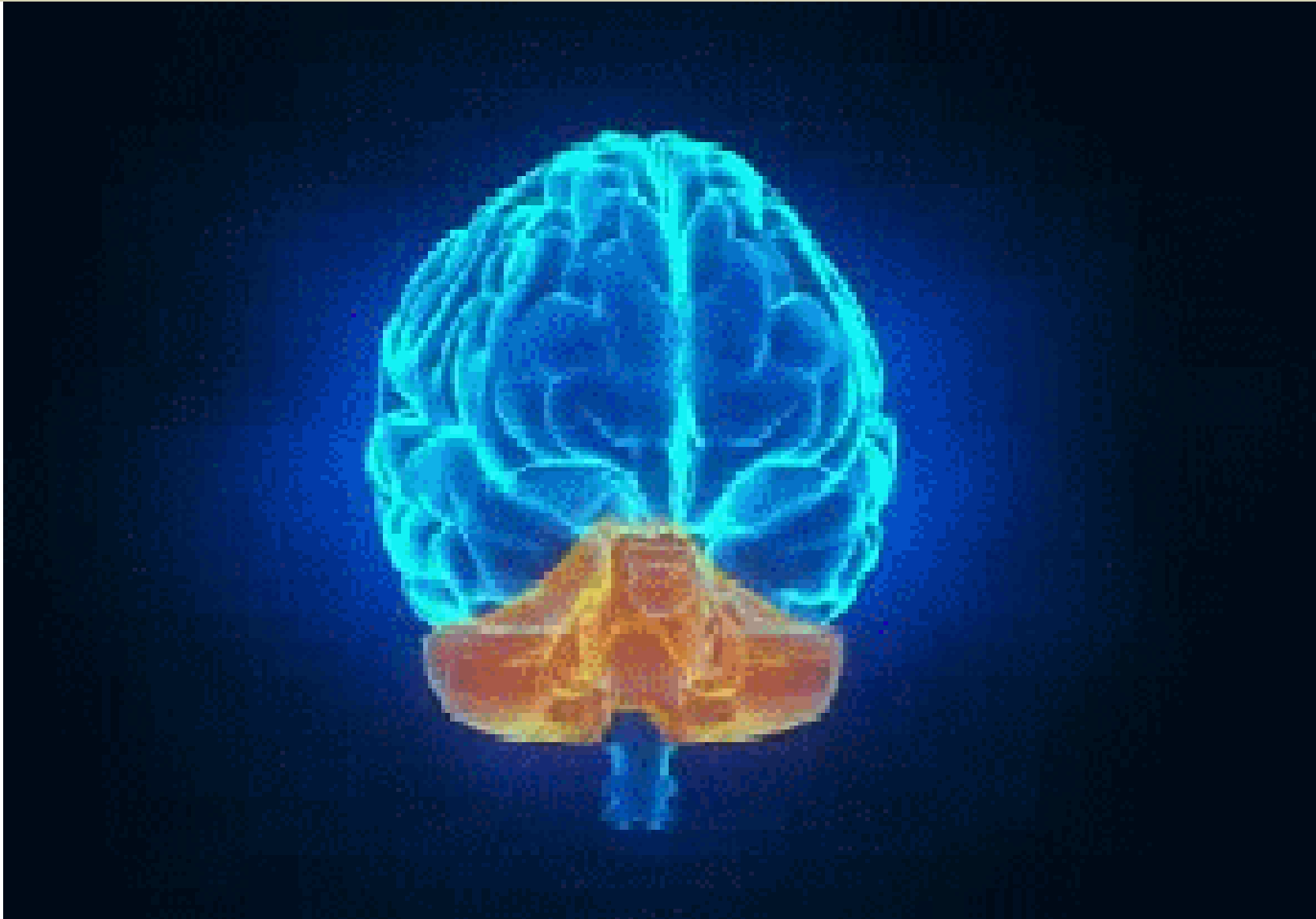
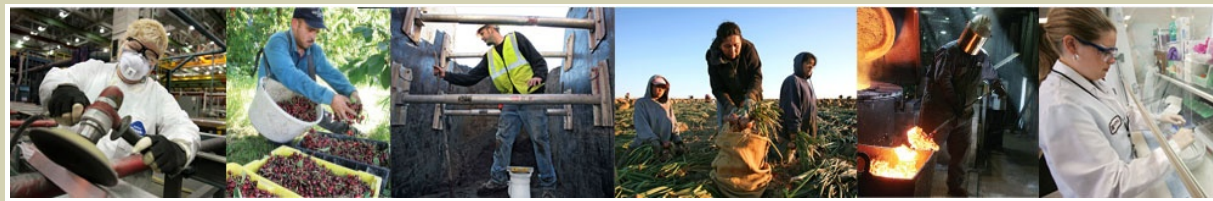
Workplace Safety and Health



Voluntary Protection Program

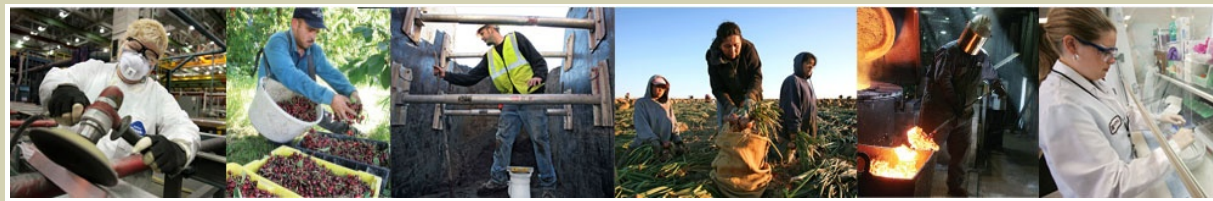


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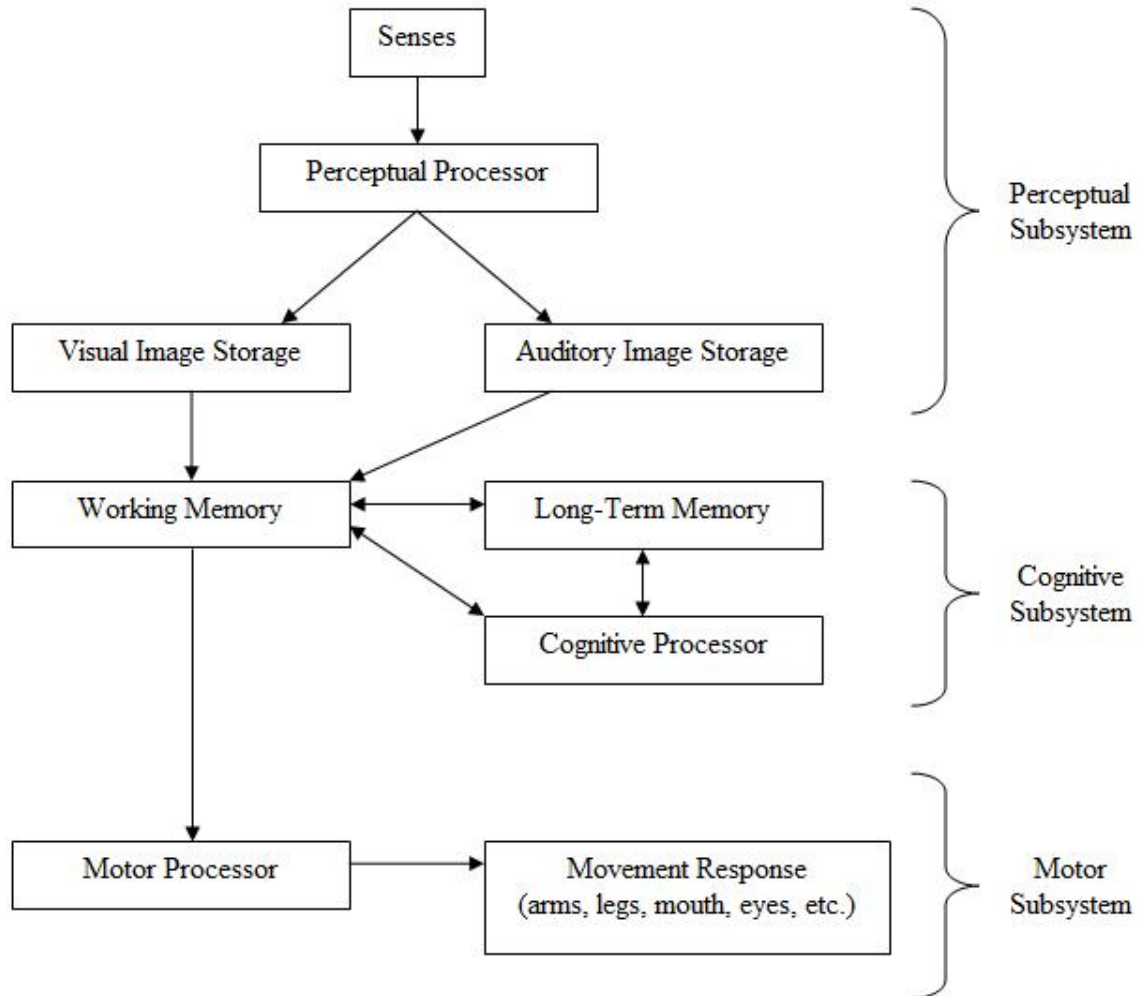
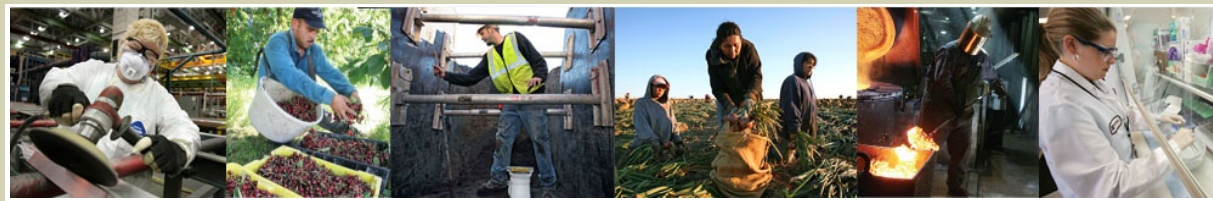
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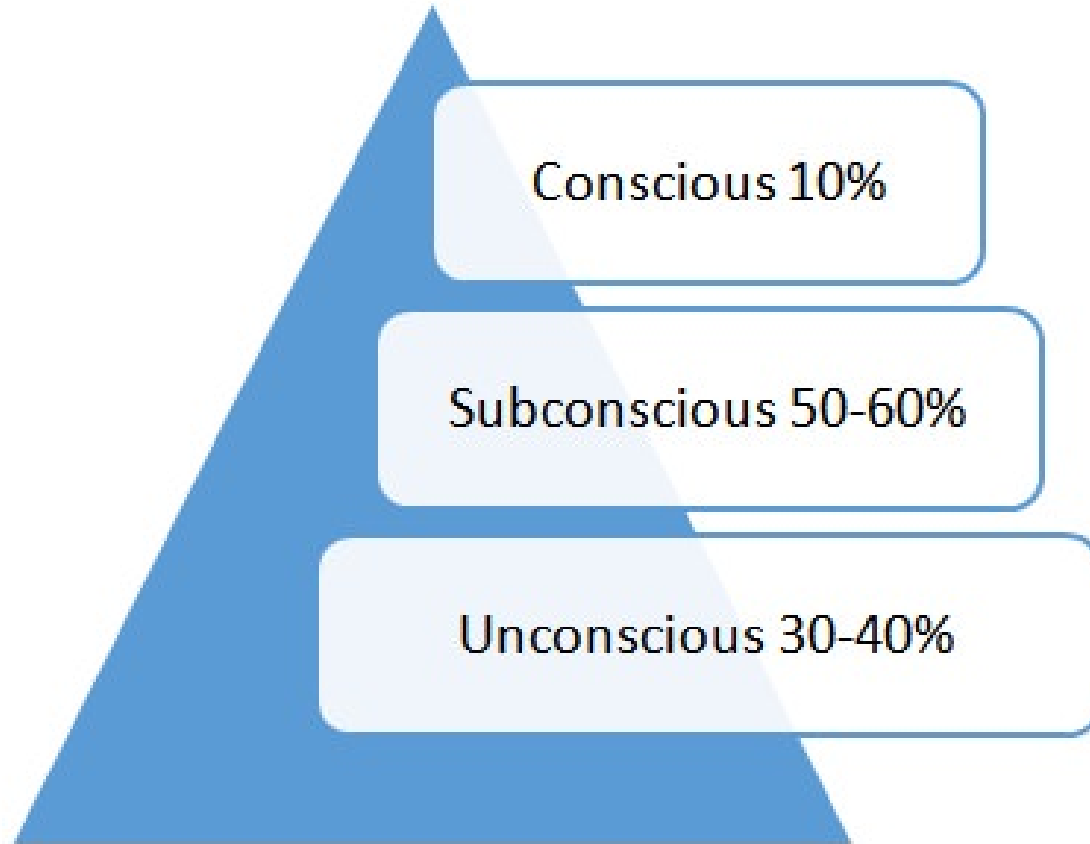
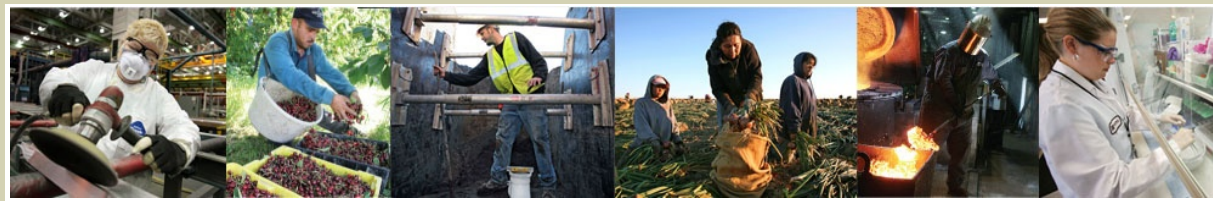


FATALITY NARRATIVE



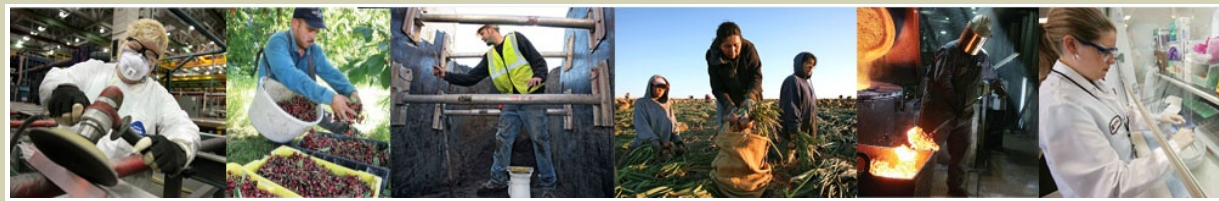
Photo of the automatic laser guided vehicle (LGV) involved in the incident.





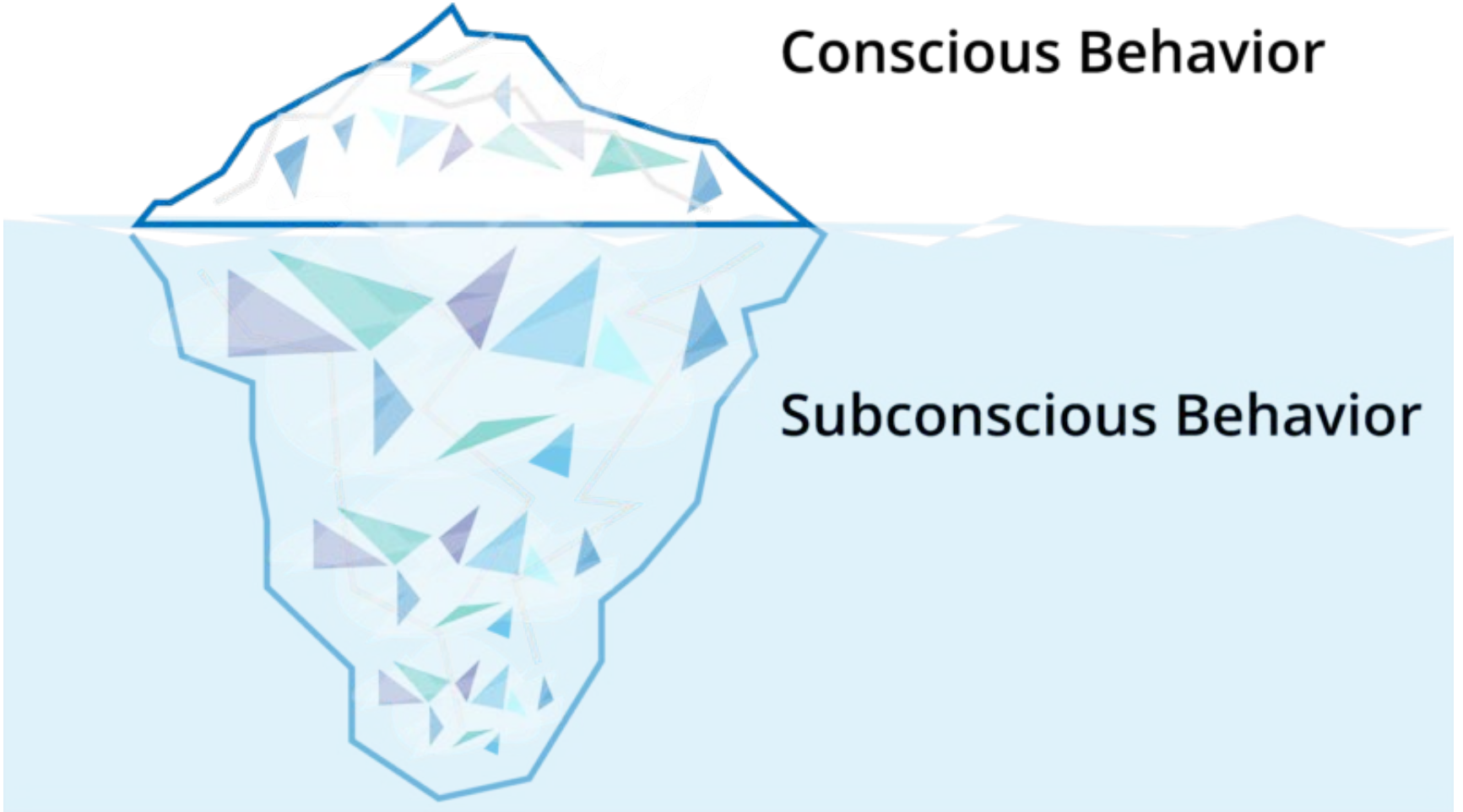


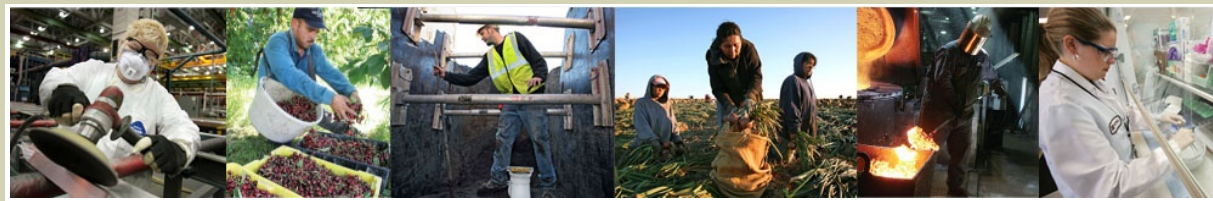
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Conscious Behavior

Subconscious Behavior

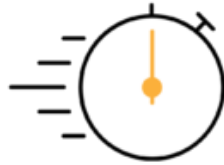




System 1

System 2

Fast



Slow

Unconscious



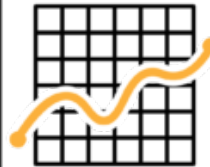
Conscious

Automatic



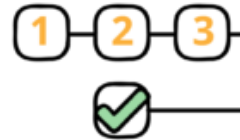
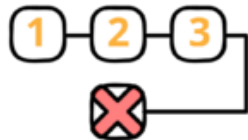
Effortful

Everyday
Decisions

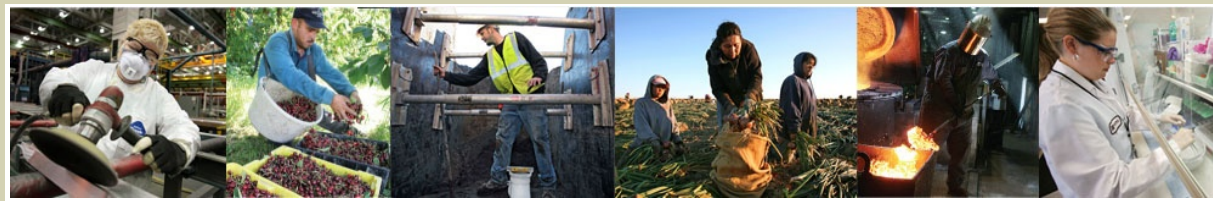


Complex
Decisions

Error
prone



Reliable



The intension is correct but it is not carried out

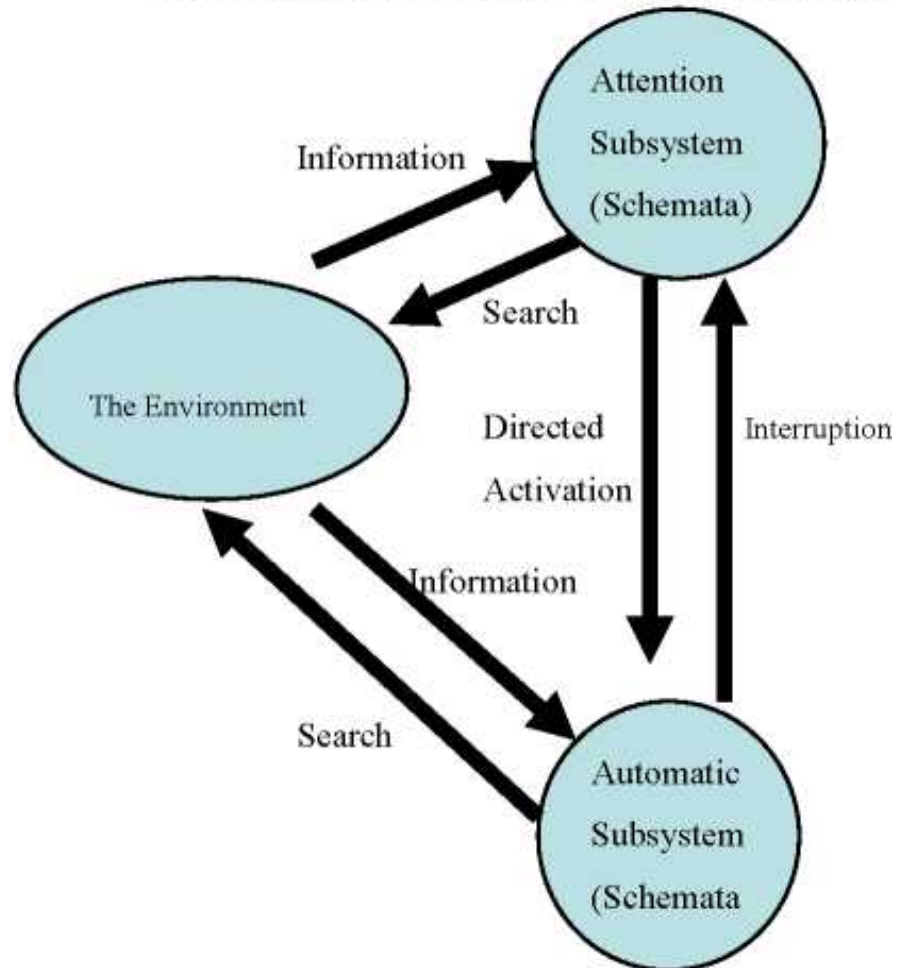
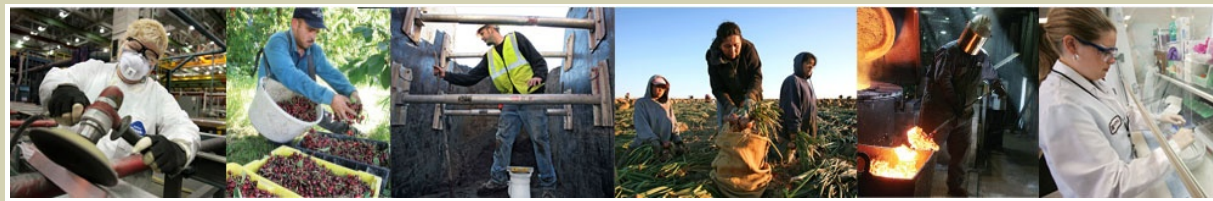


Figure 1: Three Interacting Sub-Systems.

Change Blindness (using flicker)
(from J. Kevin O'Regan - <http://hivea.psycho.univ-paris5.fr>)

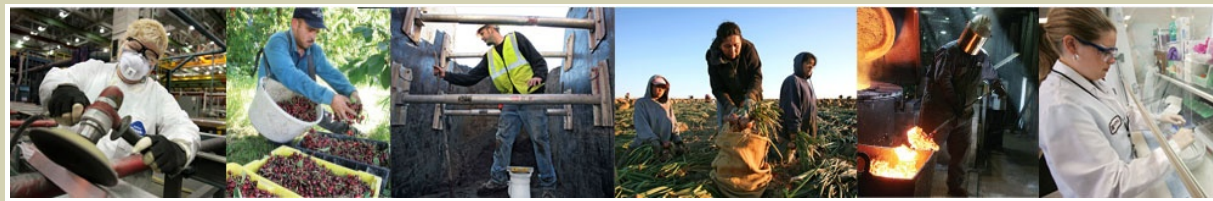


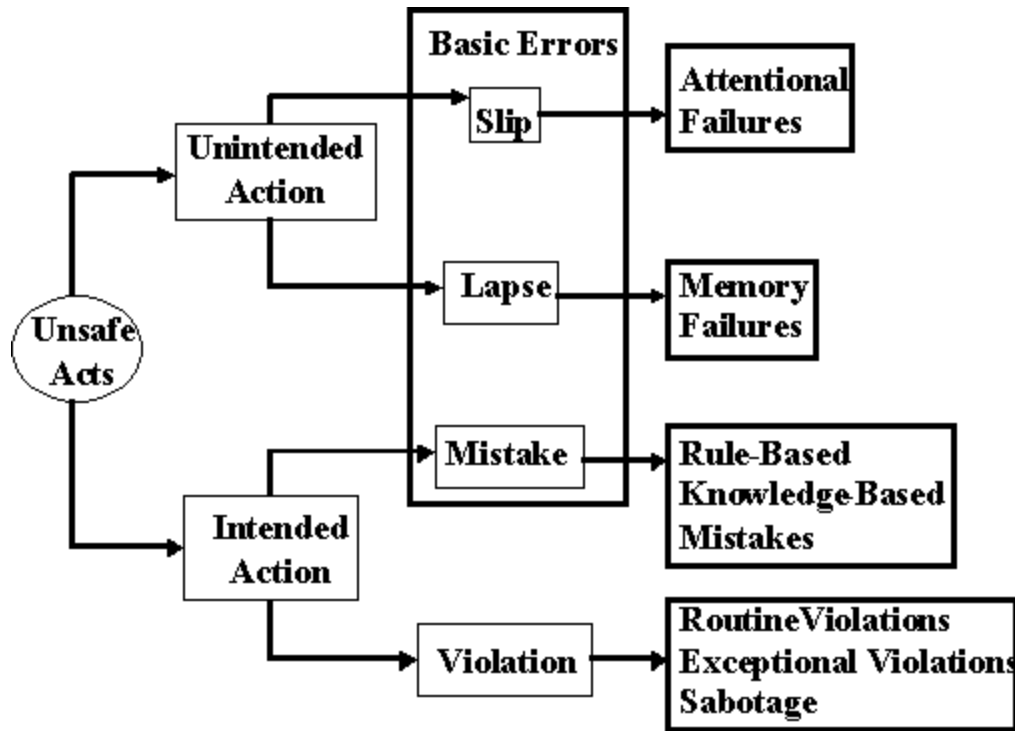
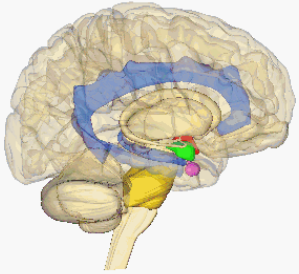
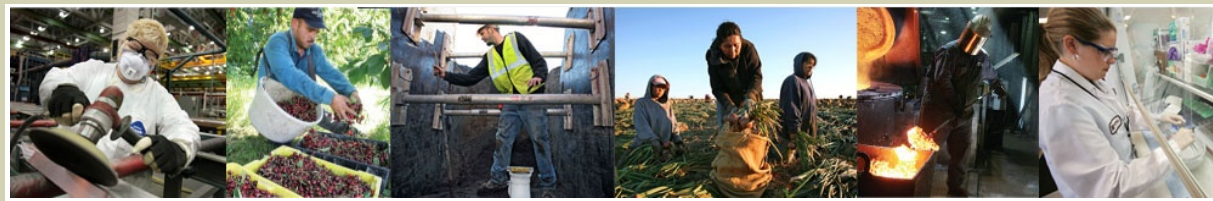
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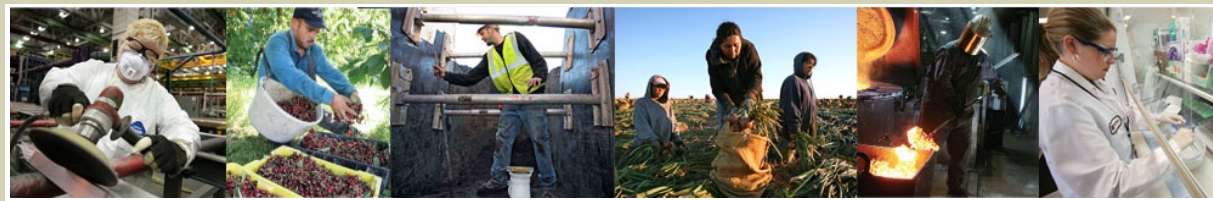
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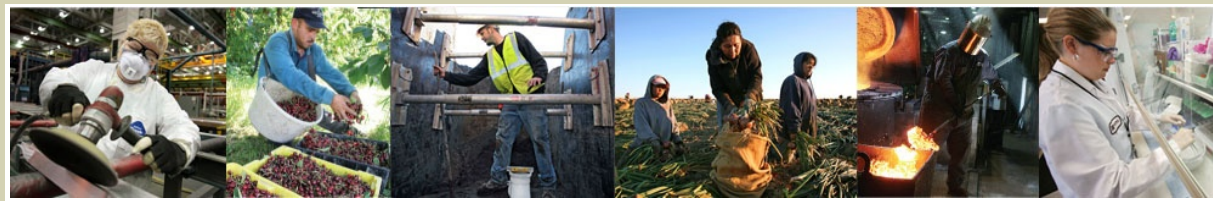


Unsafe Behavior





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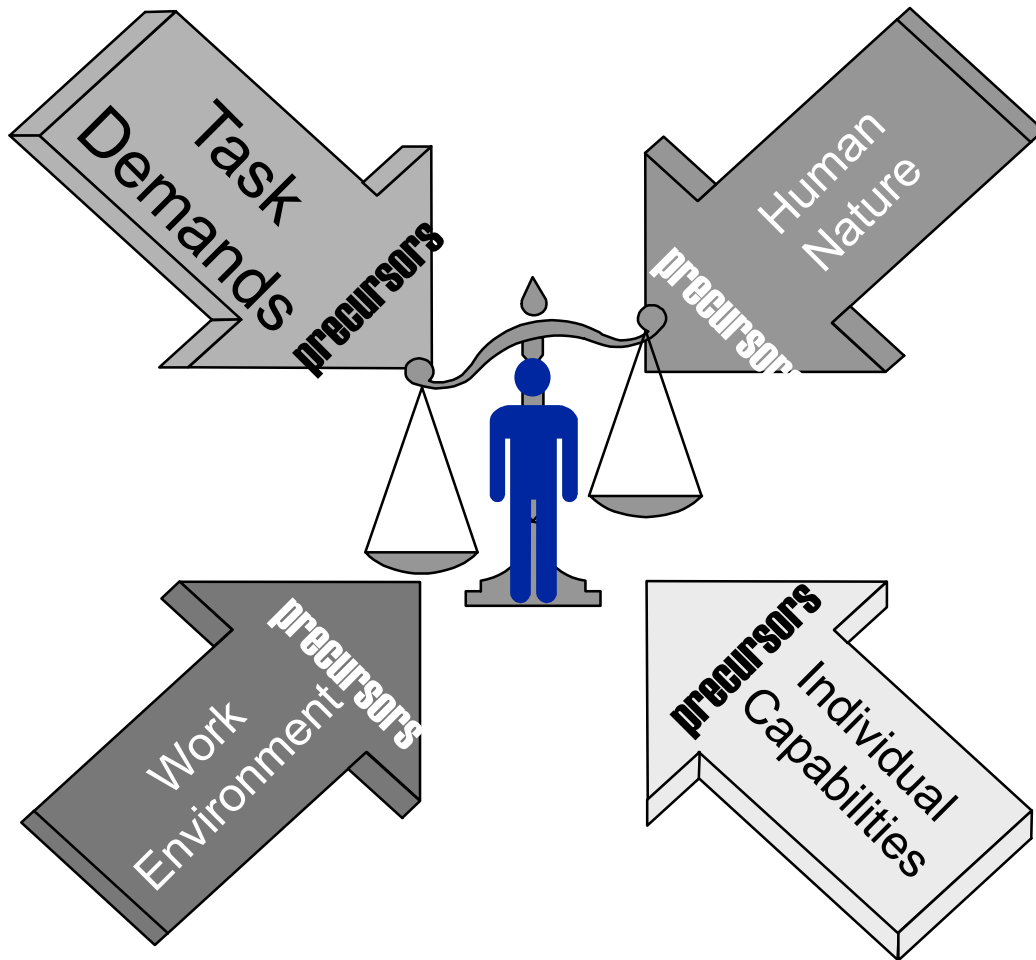
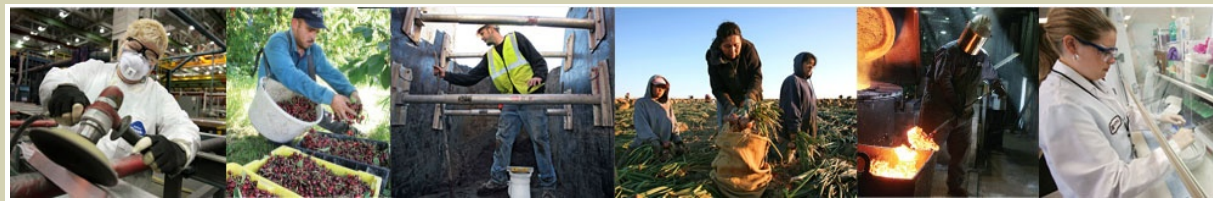


Failures in Attention

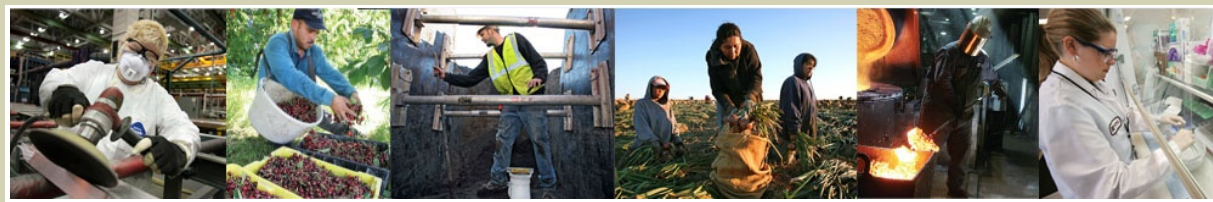
Workplace Safety and Health



Voluntary Protection Program



**An error at the
task interface
can deduced by
error precursors**



Error Precursors (short list)

Task Demands

- High workload (memory requirements)
- Time pressure (in a hurry)
- Simultaneous, multiple tasks
- Repetitive actions / Monotony
- Irrecoverable actions
- Interpretation requirements
- Unclear goals, roles, or responsibilities
- Lack of or unclear standards

Individual Capabilities

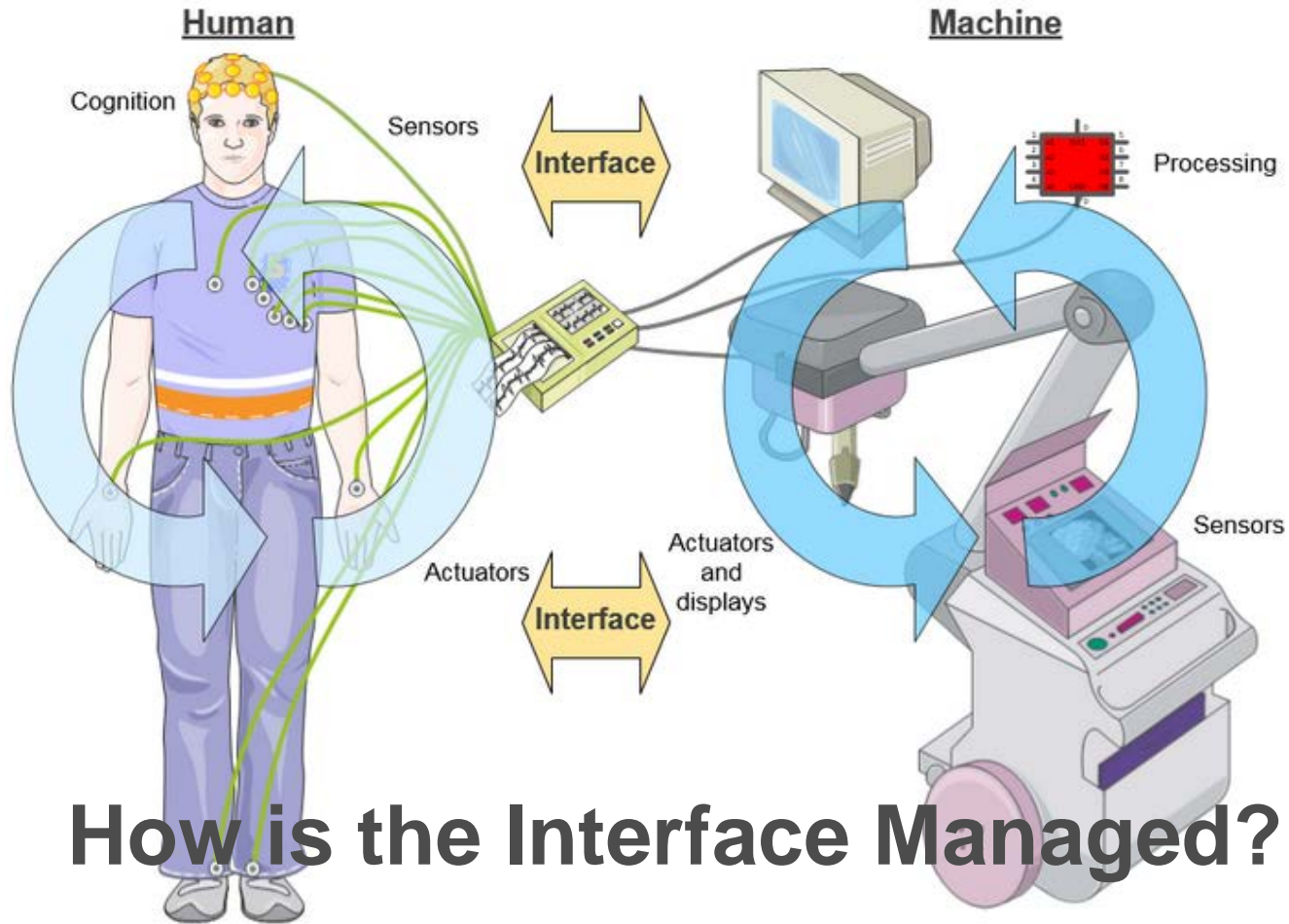
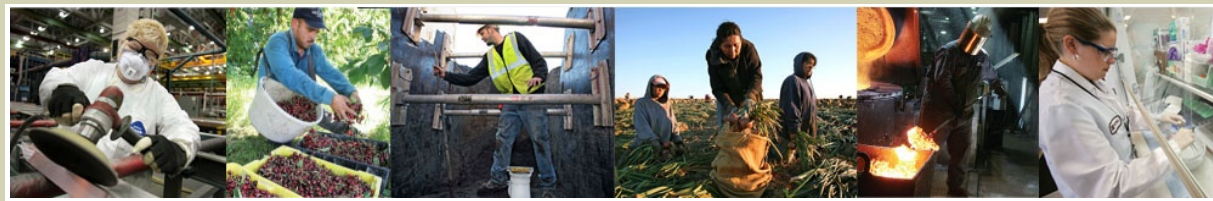
- Unfamiliarity with task / First time
- Lack of knowledge (mental model)
- New technique not used before
- Imprecise communication habits
- Lack of proficiency / Inexperience
- Unsystematic problem-solving skills
- “Can do” attitude for crucial task
- Illness or Fatigue

Work Environment

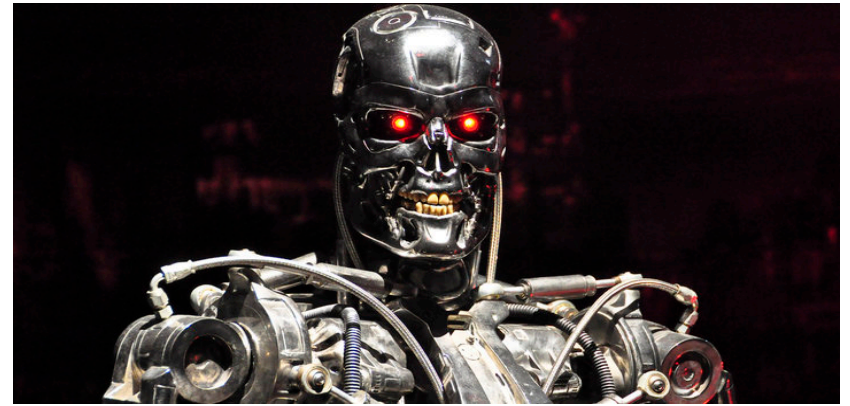
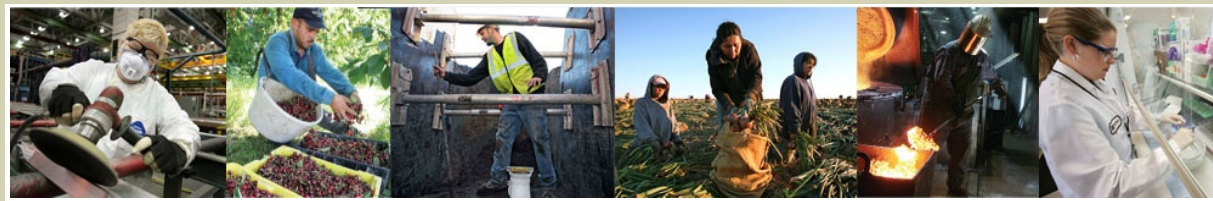
- Distractions / Interruptions
- Changes / Departure from routine
- Confusing procedure / Vague guidance
- Confusing displays / controls
- Work-arounds / OOS instrumentation
- Hidden system response
- Unexpected equipment conditions
- Lack of alternative indication

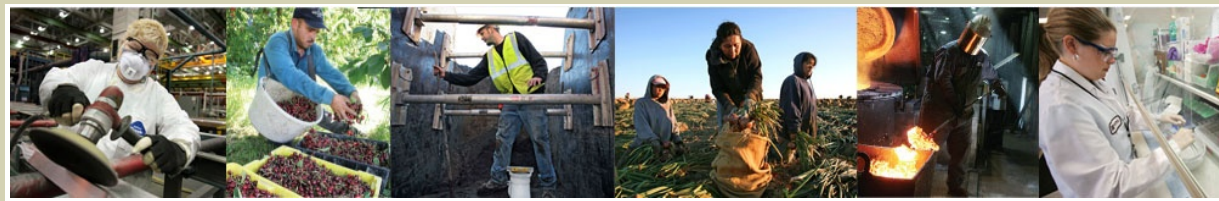
Human Nature

- Stress
- Habit patterns
- Assumptions
- Complacency / Overconfidence
- Mind set (intention)
- Inaccurate risk perception
- Mental shortcuts (biases)
- Limited short-term memory



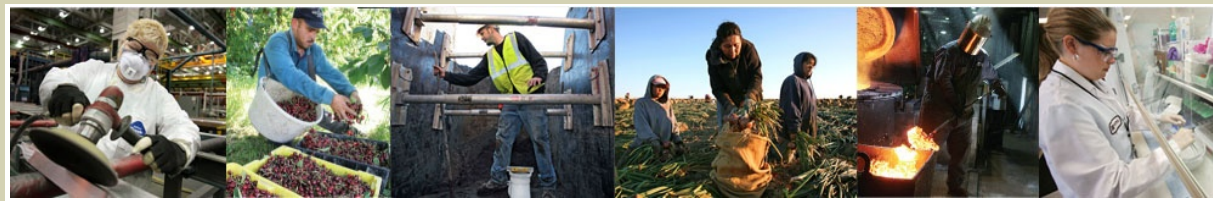
How is the Interface Managed?





Summary





Workplace Culture





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