SAFETY AND INDUSTRY 4.0

FOURTH INDUSTRIAL REVOLUTION

The impact that technology and Industry 4.0 is having on workplace safety is both fascinating and exciting. In the field of human factors and safety performance, what must we do to meet the inevitable challenges to come?

Without doubt, there are major positives for safety; as technological advances help keep workers out of harm's way. Already there is smart PPE and surveillance systems that help ensure that people wear what they should, where they should, as well as big data driven decisions reducing risk and costs at the same time. Such "better, cheaper, safer, more reliable" logic will also eventually apply to less hazardous manual tasks for which automation has traditionally been unaffordable. There are clear long-term health benefits associated with increase automation/robotisation too, with fewer incidents of harm due to repetitive work. It is possible as well that many of the most hazardous jobs will simply disappear. But, as we shall see below, this does not mean that we can lessen our efforts to increase safety; in fact, with new technology come new challenges that require a renewed focus on human factors.

SPEEDY EVOLUTION NOT TRUE REVOLUTION

When it comes to job numbers, experts are divided on the long-term impact of automation. In the past, technological advances have ultimately increased the aggregate number of jobs in the economy as some jobs disappearing but new ones emerging in their place.

However, as industry 4.0 comes to pass, people will clearly **still be needed to design, build, install, run and maintain the new technologies; new industries will also appear that we have yet to imagine.**
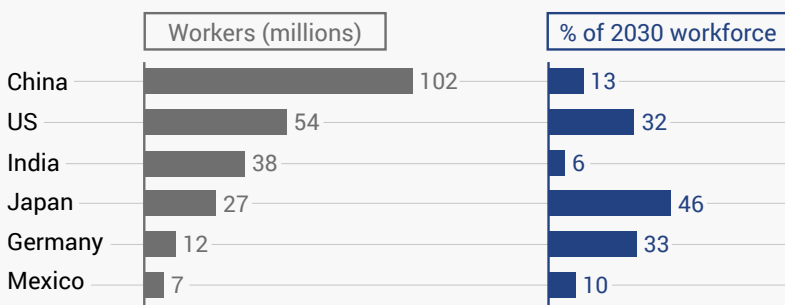
Yet, most experts agree that, despite the faster rate of change, over the next ten years or so, we will not see a radical overnight shift in the employment landscape. We will still need people to negotiate existing hazards and deal with the coming changes and hazards that the workplace of the future will bring.

So what will cause injuries in the future? The same things that cause injuries now. There are only three possible reasons why people get hurt. Either you do something that leads to your own injury (the most common), the "other guy" does something that leads to you getting hurt, or a non-human event (e.g. equipment breaks, or act of God) occurs that leads to an incident (Figure 1).

Most often, when people get hurt in the workplace it is during everyday activities such as walking around, using the stairs, or encountering objects, other

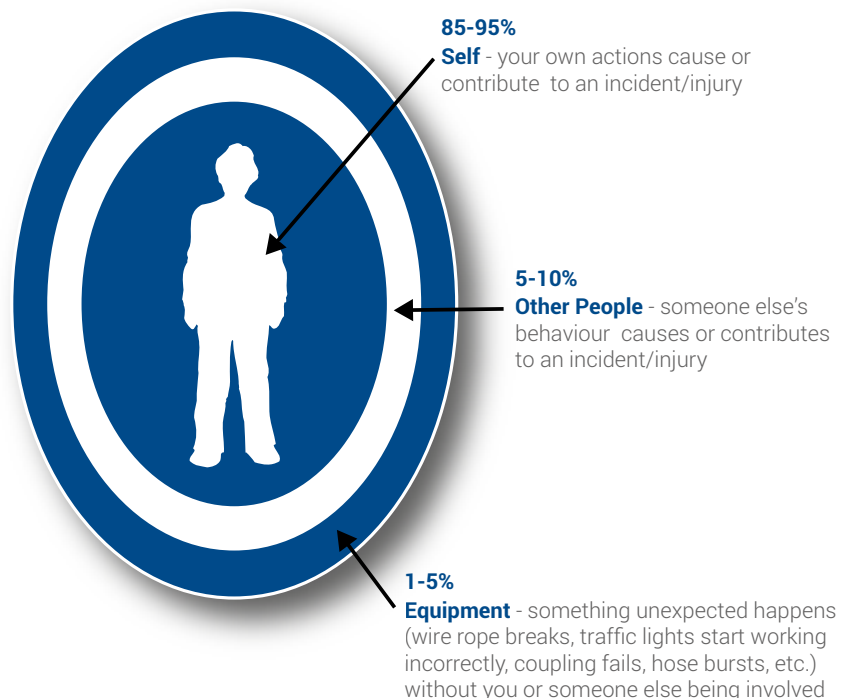**NUMBER OF WORKERS NEEDING TO FIND NEW JOBS DUE TO AUTOMATION**

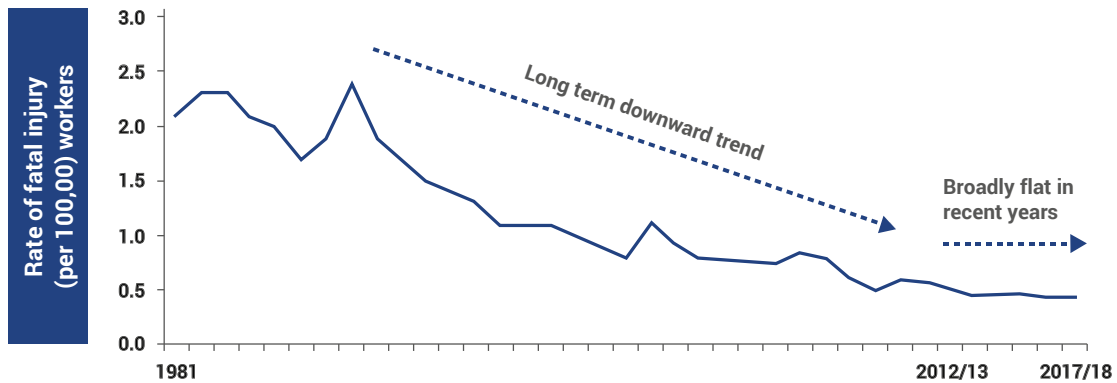|	Workers (millions)	% of 2030 workforce
China	102	13
US	54	32
India	38	6
Japan	27	46
Germany	12	33
Mexico	7	10

ATLAS | Data: McKinsey Global Institute

Source: HSE 2017

people or moving equipment/ vehicles. These are eventualities that one cannot engineer out of existence or easily guard against.

Companies typically reach a plateau where doing more of what they have done in the past, the things that significantly reduced injuries over the longer term, lose effectiveness. Technology may eventually move us beyond that plateau, but until we are at the stage of airbag-deploying workwear that senses a fall as it is happening, these types of injuries will persist.

85-95%
Self - your own actions cause or contribute to an incident/injury

5-10%
Other People - someone else's behaviour causes or contributes to an incident/injury

1-5%
Equipment - something unexpected happens (wire rope breaks, traffic lights start working incorrectly, coupling fails, hose bursts, etc.) without you or someone else being involved

Figure 1

Rate of fatal injury per 100,000 workers

Rate of fatal injury (per 100,00) workers

3.0
2.5
2.0
1.5
1.0
0.5
0.0

1981

Long term downward trend

Broadly flat in recent years

2012/13   2017/18

CRITICAL STATES OF MIND

Why and when do people get hurt? For the vast majority, it is about states of mind or body such as **rushing**, being **frustrated** with a situation, being **tired or fatigued** or simply having done something so often for so long that we become **complacent** and go on autopilot.

We are hardwired to function subconsciously the vast majority of the time. Thus, complacency becomes pervasive once we get used to doing something. Indeed, technology can even exacerbate complacency: if we rely on tech to keep us safe, what happens when it fails or is absent?

THE FOUR CRITICAL ERRORS

From a safety point of view, we can simplify mistakes into four critical errors: **Eyes not on Task**, **Mind not on Task**, putting oneself **in the Line of Fire** or losing **Balance, Traction and Grip**. These four errors account for over 90 percent of all injuries (and a lot of other non-safety mistakes too). With a mere four errors in play and those errors most likely to happen when we are in one of four states, the problem of reducing error becomes easier to tackle – and with it the chance to reduce injury levels (Figure 2).
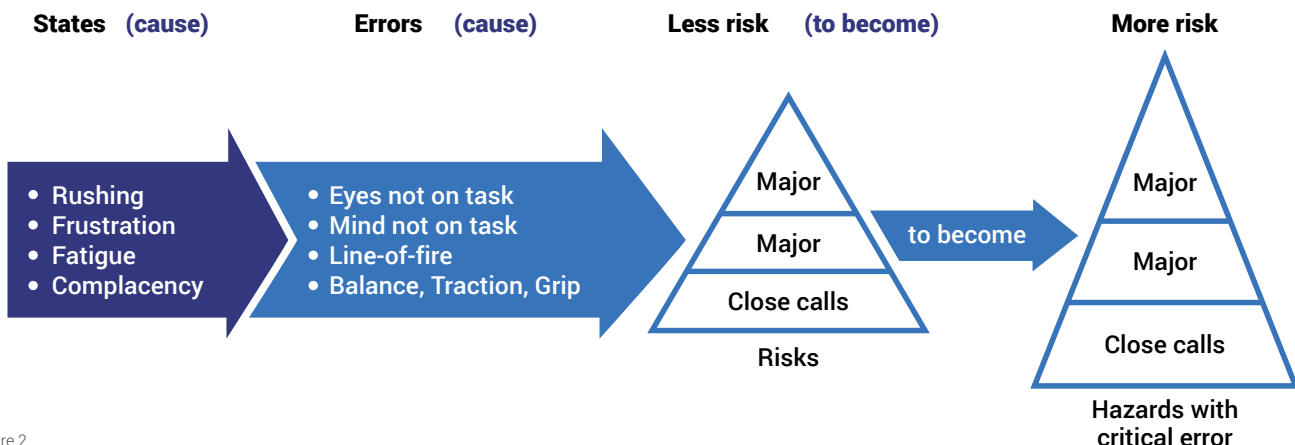
States (cause)   **Errors** (cause)   **Less risk** (to become)   **More risk**

- Rushing
- Frustration
- Fatigue
- Complacency

- Eyes not on task
- Mind not on task
- Line-of-fire
- Balance, Traction, Grip

Major
Major
Close calls
Risks

to become

Major
Major
Close calls

Hazards with critical error

Figure 2

ERROR REDUCTION

To reduce critical errors therefore we can ingrain new skills and habits that will account for these states and allow us to avoid making critical errors. Using the same types of neural pathways that make us go on autopilot, we can give our brains failsafe techniques for when we are most likely to make an injury-causing error.

One of the first techniques we get people to practice is to observe those around them. If we see someone in one of the four states – rushing, frustrated, and looking tired or on autopilot – it helps us to bring ourselves into the moment, keep out of harm's way and also reflect on our own actions.

Another good technique is to reflect on the small mistakes that we make and look for a link to one of the four states. Such reflections can turn out to be hugely consequential.

We also work to help people recognise when they are in one of the first three states: rushing, frustration and fatigue (combatting complacency requires a different approach). The breakthrough comes when people learn to both amplify and listen to their own inner voice telling them that something feels wrong. We call this technique Self-Triggering – catching oneself in one of those states before an error or injury occurs.

All this takes time and practice and will become, if anything, more relevant as technology's impact grows and new equipment and industries become a reality. Whatever happens, the human factor will remain critical in Industry 4.0. Alongside advancing engineering and technological solutions that address risk, we will always need to help people develop the personal safety skills that allow them to deal with the new world, whatever that ends up looking like.

About the autor

David Hughes is the Development Director for SafeStart in the UK, Ireland and Nordic countries as well as managing some of SafeStart largest global projects. A highly experienced member of the SafeStart team, David has designed, delivered and managed sustainability-based consulting, Behavioural Safety, culture change and learning and development projects with SafeStart since 2007. David works across a variety of industries, such as Oil and Gas, Pharma, Chemical, Manufacturing, Transport and Logistics and Food to name but a few.