



Controlling Risk in a Dangerous World: How to Prevent the Next Accident



Jim Wetherbee has 35 years experience in high-risk operational environments and

works with leaders in hazardous industries with critical mission objectives. Jim is the only American astronaut to have commanded five missions in space, and the only person ever to have landed the Space Shuttle five times. After a twenty-year career in the aerospace industry as former NASA executive and astronaut, Jim joined the oil and gas industry as a Safety and Operations Auditor for BP and then as VP for Operating Leadership.

Bringing his thirty-five year experience working in hazardous endeavors, Jim Wetherbee talks us through some of the adverse conditions in high-risk organizations that can cause accidents.

Jim, tell us about your professional journey at NASA?

After studying aerospace engineering in college, I joined the US Navy and became a naval aviator, flying single-seat jets from aircraft carriers. I became a US naval test pilot before joining NASA in 1984. I feel extremely privileged to have flown six flights in space, twice to the International Space Station, and to have commanded five missions.

After I left NASA, I looked for a company where I could believe in the mission, and I joined BP. I worked as

a safety auditor for seven years, and helped to enhance a rigorous discipline of safety and OE. I now help high-risk companies deal with hazards while still being productive.

Tell us about your time at BP and some of the critical work you did.

Following an explosion at Texas City in 2005, the company wanted to bring in expertise from engineering disciplines; aviation, nuclear etc. That's why I was hired as a safety auditor. I found the industry almost identical to the space industry in regards to hazards. We worked with the same hydrocarbons and explosive energy, and had similar engineers and managers trying to manage risk. In many cases, we had the same equipment. It was a matter of applying the same principles of risk management.

During this time I began to realize that some companies understand managing risk but do not fully understand controlling risk, which is what the frontline workforce does when they pick up their tool bags and go to work. They think about hazards differently than managers do in the office. I was able to help with both managing and controlling risk.

In your opinion, how can companies operating in hazardous industries better control risk?

In 1998, my boss at NASA had an insight that the astronaut office was headed for trouble. He asked me to direct flight crew operations and told me, “don’t let them have an accident”. At the time, I had 150 astronauts under my directorship.

I pulled together a small team to assess our safety culture. We began to realize that, in 1959, NASA hired astronauts from the cadre of military test pilots, because they already understood OE principles in the flight environment. But, over the years, we had begun to hire more engineers, doctors, scientists and mathematicians, who were very talented individuals, but didn’t innately understand the principles of flight operations.

The first thing I did was write down the principles of operating excellence in flight operations. From those we developed techniques of operating excellence for flying in space. We realized most industries have a set of safety rules, policies and procedures that are closed, non-adaptive and rigorous. Following the rules will help prevent most accidents. But if we could supplement that suite of rules, policies and procedures with principles and techniques which are open-ended and adaptive, then we would have the ability to prevent all accidents, even those we were not anticipating.

It’s another way of saying, if you’re always doing things right, then you will be able to capture the smallest deviations from normal operations, and will be able to prevent all accidents, while accomplishing the mission in the most productive way possible.

In your book “Controlling Risk: Thirty Techniques for Operating Excellence” you talk about the most common adverse conditions that existed in high-risk organizations leading up to a major safety incident. Can you tell us a bit about these?

Organizations are large sociotechnical entities – there have a social element of how people work together, and a

technical element which is the systems and technical processes. Most companies focus on the technical side after an accident to try and prevent the next, but in reality the social side is more important. I often use the explanation that NASA needed technical people to get us to the moon, but we needed the social element to pull together as a team and bring the Apollo 13 astronauts home after the explosion when unknown and unanticipated situations occurred.

The number one adverse condition in any organisation before a major accident is an emphasis on organisational results instead of the quality of individual activities. You can see executives focused almost exclusively on results, which are certainly important to the company. But, the workforce doesn’t create results; they only conduct activities. It is the integration of activities over time that creates results. Let’s say you’re in the business of making computers. On a given day, a worker is building only a part of that computer. It’s at the end of a long month of activities, conducted by many workers, that the computer is built. The quality of activities over time determines the quality of the results.

When executives are focused only on results, people take shortcuts to deliver the results more quickly. Shortcuts cause problems. The only thing a worker can do to improve results is improve the quality of individual activities which, over time, creates the best results. In a dangerous business, a single, poor quality activity can cascade quickly to disaster.

The second condition is that organizations stop searching for vulnerabilities. After an accident, the organization usually conducts an investigation. Often the investigators will determine an immediate cause or proximal causes. They may publish a report specifying that the organization failed to identify the particular vulnerabilities before



the accident. But, over the years, I have noticed something different. Before disasters, organizations are not only failing to identify a single root cause, or even a handful of proximal causes; in the time leading up to disasters, organizations generally are not trying to identify any vulnerabilities. Of course, it's always easier after an accident to identify lines of causality because we can retrospectively see what happened.

It's a lot harder before the accident to predict the one minor problem that might cascade to disaster. Often, though, organizations are not looking for any problems. The managers think operations are going well. They stop encouraging the highly valuable pursuit of searching for all vulnerabilities.

The third condition is that organizations don't create accountability before an incident. A lot of companies understand the concept of accountability after an accident, which you see in the form of blame or punishment. What I rarely see is accountability being exercised before an incident.

The more powerful side of accountability is the positive side; it's the conversation you have with your boss about what you learnt last week, what's coming up next week, how you can help your team, or the challenges your team will face. If your boss asks those questions regularly you begin to feel accountable. But, if nobody is asking how it's going or what you need to be successful, then you're not accountable to anyone before the accident.

Is zero incidents possible? What should companies be doing differently today to get to zero incidents?

As more organizations have disasters, more companies realize that they can't keep operating in the way that they did in the 1950s when accidents were considered inevitable in dangerous businesses. Over time society has begun to expect no incidents, so companies are trying to operate better. On the technical side organizations have a rigorous set of rules, policies and procedures. I'm focusing on the social side and trying to help companies with the principles-based techniques of OE; if you supplement the rules with principles, then you can help the workforce be safe and productive, by producing as much as possible within the safety and operational constraints of the day.

Why are we failing to learn from incidents?

Being successful and operating with high excellence is a huge challenge in hazardous environments. I had a conversation with a crewmate in orbit where we discussed all the things that have to go right to accelerate 100 tons of hardware, software, and people to an orbital speed of 17,000 miles an hour. As we thought about all of the different engineering miracles that had to happen in a particular sequence and all of the people required to make the right decisions, we concluded it was best not to think about it. So we went back to work.

But, as an executive, manager, or worker faced with the challenges of launching other people into space, you do have to deal with it. It's very challenging. But collectively, society has demanded we figure out how to do this safely and productively. The companies that do will succeed.

The social side is also not understood well by people drawn to engineering. We tend to think that numbers, data and equations give us the answers, yet data doesn't give us the best decision-making. The best leaders make the best decisions using experience, intuition and good communication to understand the data and create a valuable judgment. The best leaders know how to work with a team and encourage dissenting opinions so that the conversation is deeper, and they achieve a better solution. We think we're rational beings, but our strength as human decision-makers is in our experience, values, and judgement.

What is the connection between culture, safety and financial performance?

In figuring this relationship out, you master the concept of operating excellence and you will get results. But the point is you can't push for results, because you get accidents and problems. If you understand safety and the principles of operating excellence, and help the frontline workers facing the hazards to understand high-quality, safe ways of working, then they will achieve the most possible, given the



operating conditions and challenging constraints of the day.

We often hear that it's difficult to get leaders involved in incident management. Why is this?

Managers and executives are responsible for developing the company strategy, so that's what they focus on. The frontline workforce worries about the tactics and how to accomplish their tasks. The middle-level managers, between executives and frontline workforce, translate what executives desire to the workforce and listen to the workforce and their requests.

Everybody is doing what they think is expected of them, and most of the time it works well. Occasionally they have an accident, and generally, they find the executives and middle managers

were spending too much time developing strategy and not enough time understanding the challenges and hazards the frontline workforce was facing.

The workers also tend to not really think about the overall mission and instead focus on their tasks. Over time, they begin to accept risk or hazards. They have a higher risk tolerance because they think that's expected of them. They're not thinking of the long-term company mission. They're only thinking about getting the job done today. They don't think they'll get hurt.

All three levels are doing what they think is right, but they end up with behavioural influences that 'derail' the organization, resulting in accidents. The way to manage that is to understand the derailleurs that lead to accidents. We

need catalysers or different ways of influencing behaviors and thinking that help the workers prevent accidents. This is about supplementing the rules with the principles and techniques of operating excellence.

The only way to do it is to help companies understand that rules and policies and procedures only get you so far. By supplementing the rules with principles and techniques of high-quality operating excellence, you have a winning combination.

Helping people master the social side of the sociotechnical system will lead the company to not only prevent accidents but accomplish the most possible within the operating and safety constraints of the hazardous environments.

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