On March 23rd of 2005, a crew at BP’s Texas City refinery worked to restart the plant unaware that 15 would never see their families again and more than 200 lives would be deeply changed recovering from injuries in what would be the deadliest industry accident in US history. An early investigation assigned negligence of the front-line operators and supervisors in their failure to follow the procedure. What came to light later was shocking and hard to grasp. The lessons from this accident offer remarkable insight into understanding human influences in operation systems.

Early in the 20th century in response to similar events, both catastrophic and minor in terms of outcome, a community of interest formed with the objective of understanding the human influence on systems in order to achieve consistent and reliable outcomes. In fact, an academic discipline, Human Factors and Ergonomics, emerged applying scientific methods, statistical analysis and psychology to study the human performance and the man-machine interface. After decades of published research, the solution still eludes us. More recently, the concept of a High Reliability Organization (HRO) studies the reliability of human performance in context to the operational and economic risk to an organization where failures can have a devastating and unacceptable impact on the people, the equipment and the environment.

The term human reliability provokes diverse reactions depending on perspective. In some views, they are almost a contradiction in terms. The basic pursuit of human reliability is to form a system involving human influence and interaction with equipment and an environment that responds predictably and reliably in order to achieve its designed function or objective.

With all of the research, operational experience and lessons, the challenge remains translating key principles of human factors into the operational setting. Today, organizations are seeing a plateau in safety progress from conventional safety and risk management programs.

Effective application of human factors begins with a philosophical change in the way we approach the human element of our operations. Slight exception notwithstanding, we must understand people do not set out to cause failure, their desire is to succeed. In fact, humans have an ability no other system does, which is to adapt to changing conditions, system design variance and unanticipated circumstances.
A systems design view approaches the operation linearly and plans reliability into components in order to extrapolate system and human reliability. Conversely in the field, operators and teams seek with good intention to balance the rivalry between preservation[safety] and production[productivity]. People operating tools and equipment guided by conflicting objectives within an operational setting that includes physical, technological, regulatory and procedural environments are provided information and within their capability for good judgement make choices that lead to outcomes, both positive and negative. It is within this multidimensional concurrence we can influence the reliability of human performance. Understanding this concurrence directs us away from blaming individuals and towards determining why the system responded the way it did in order to modify the organization.

In this presentation drawing on lessons from US Navy Aircraft Carrier, Nuclear Propulsion and Commercial Aviation operations, we will consider a set of consistent key principles which suggest that error is a natural and inescapable characteristic of tasking and that reliability, while not synonymous with safety, will create operational resiliency. We will also dispel myths such as human’s are erratic and unpredictable or highly trained and experienced people do not make mistakes, with the objective of considering some practical programs that produce human reliability.