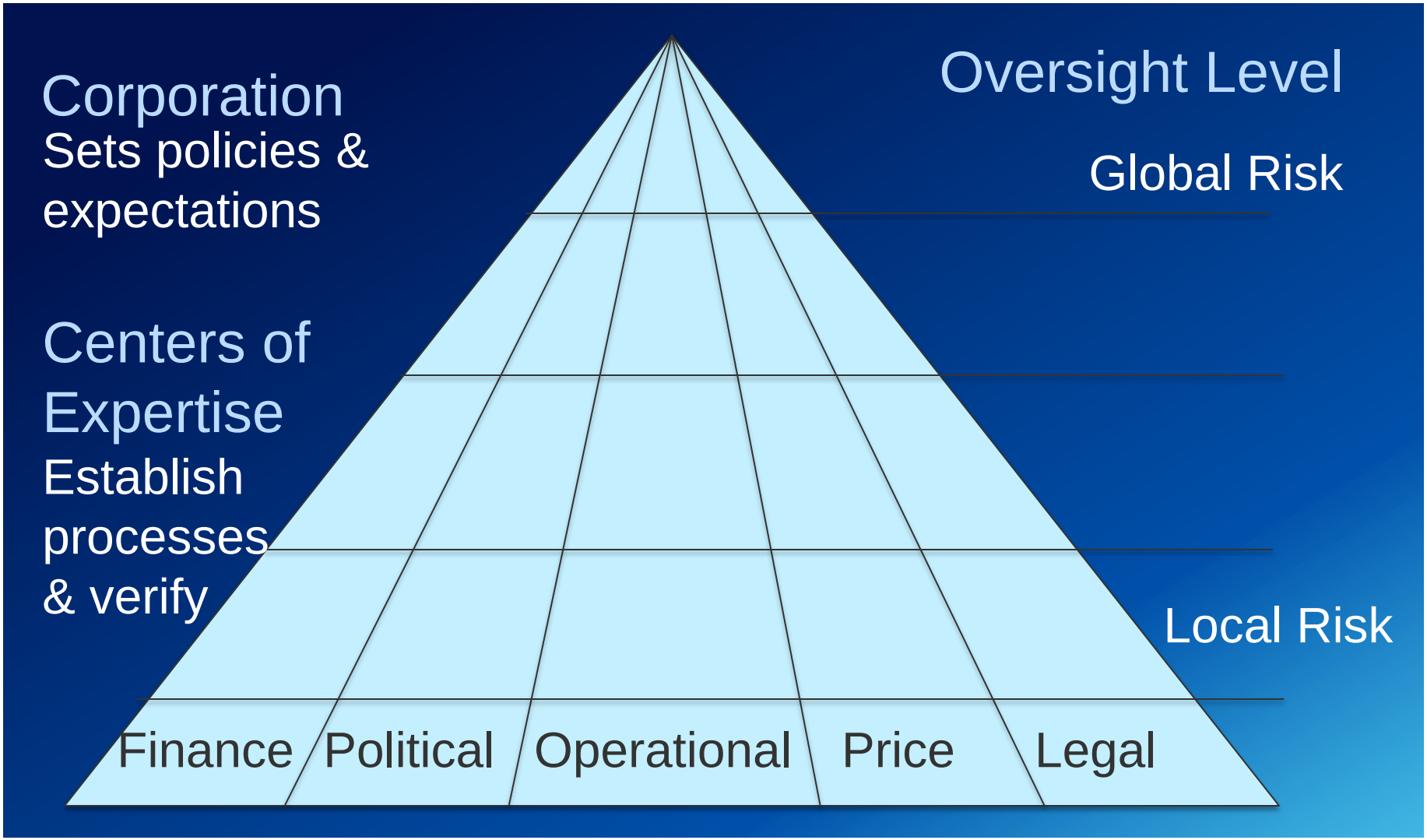
Risk Management at Chevron

Jean Bruney

AIChE/SACHE Workshop

Context for HES Risk Management



Review of Terms

Risk

The probability that a hazard will result in a specified level of loss.

- Defined mathematically as:
  Risk = [Severity] x [Frequency]

Risk Assessment

The application of a procedure that asks:

- What can fail or go wrong?
- What are the consequences?
- What is the likelihood?
- How do the likelihood and consequences combine to give a statement of risk?

Qualitative Risk Assessment

A team of experienced personnel judge the consequences and likelihoods of events of concern based upon their experiences.

Quantitative Risk Assessment

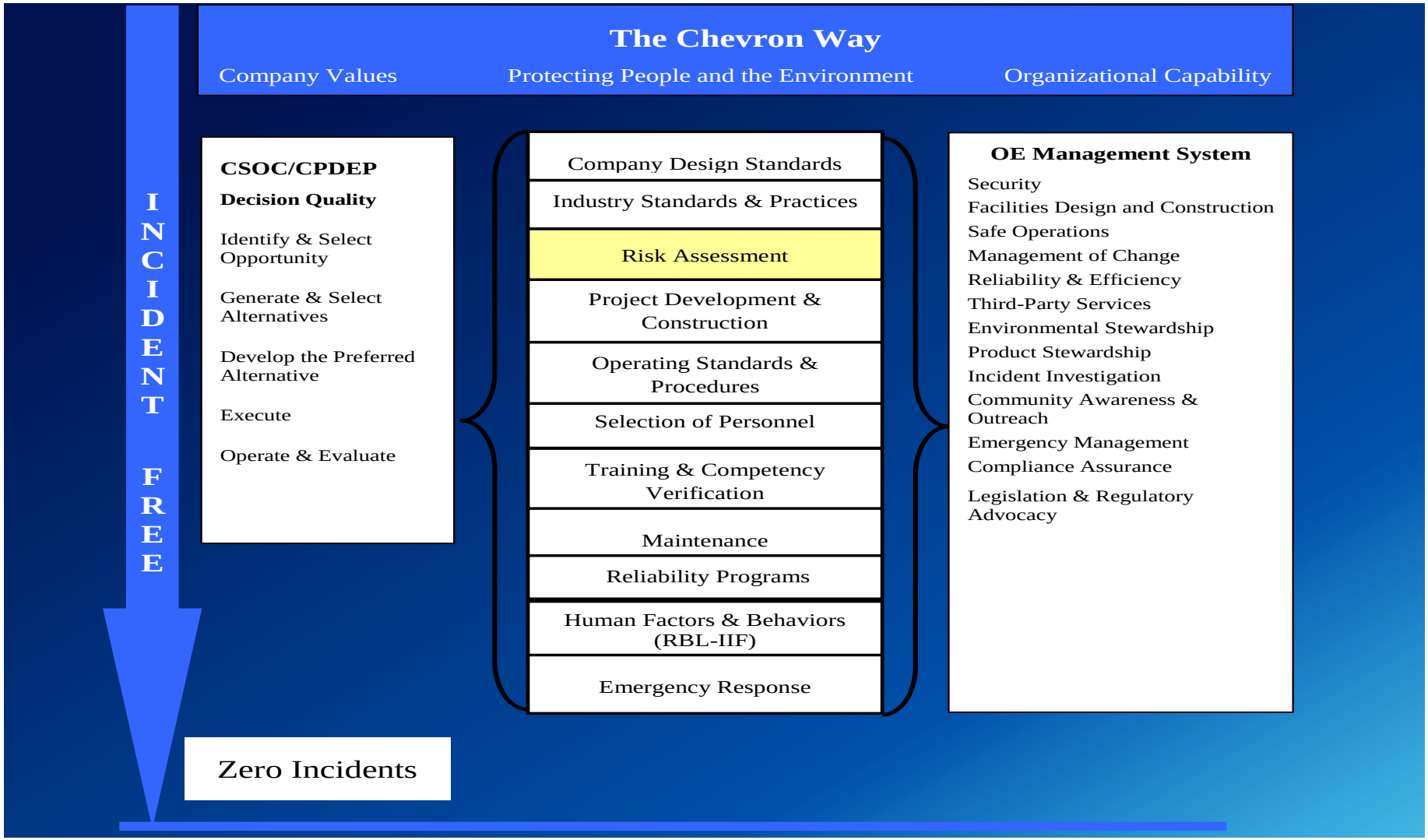
Qualified analysts apply validated modeling tools, data and mathematical techniques to quantify the consequences and likelihoods of events of concern, which are then combined in risk statements.

Risk Management Defined

"The systematic application of management policies, procedures and practices to the tasks of analyzing, assessing and controlling risk in order to protect employees, the general public, the environment and company assets while avoiding business interruptions."

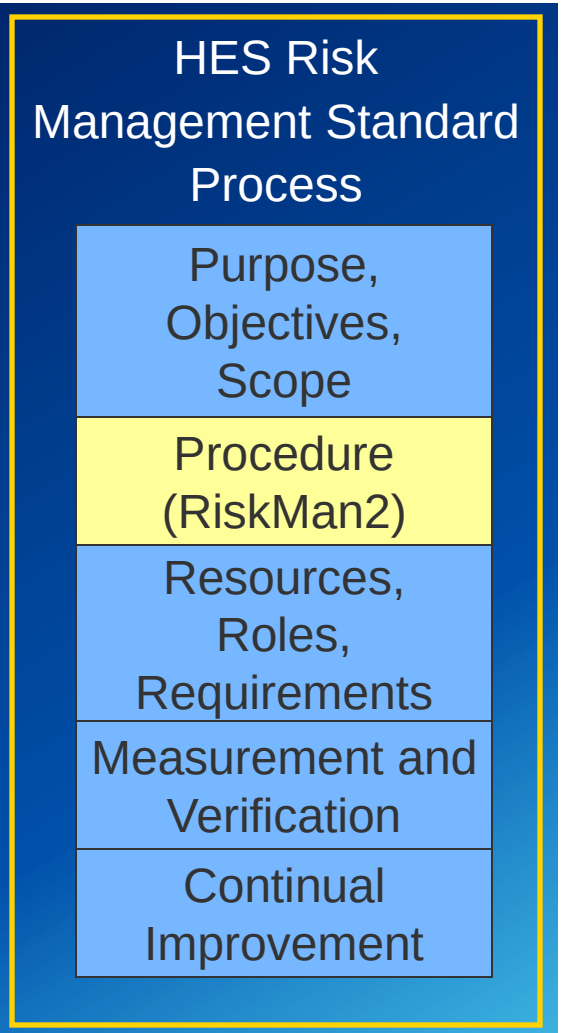
AIChE Center for Chemical Process Safety

Context for HES Risk Assessments

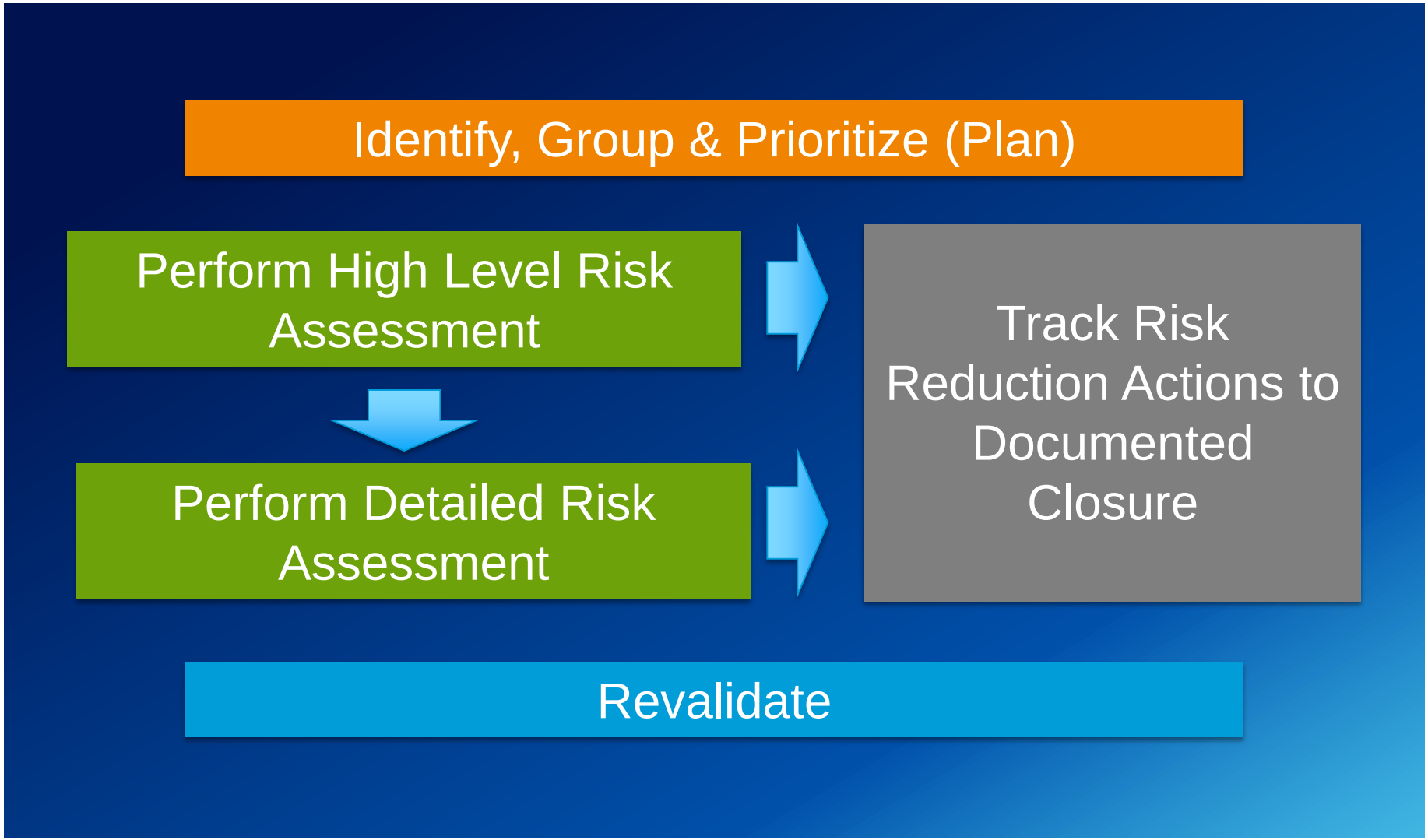


Chevron Corporate HES Risk Management Process

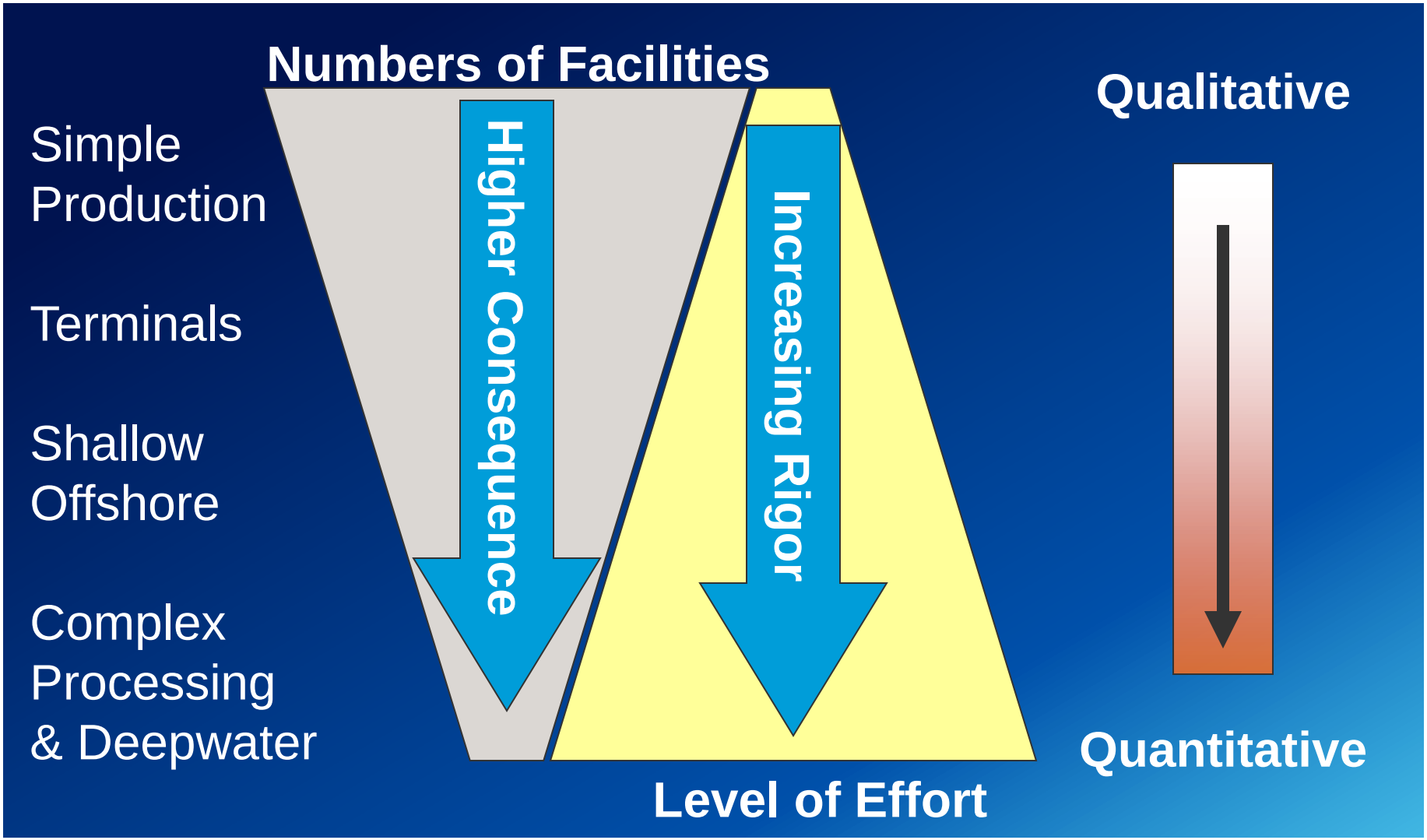
- Structured process
- Clearly stated objectives
- Enterprise-wide scope
- Mapped to specific OE expectations
- Defined roles and responsibilities
- Specific leading and lagging measures reported annually at the corporate level
- Common risk assessment and management procedure: **RiskMan2**



HES Risk Management Procedures



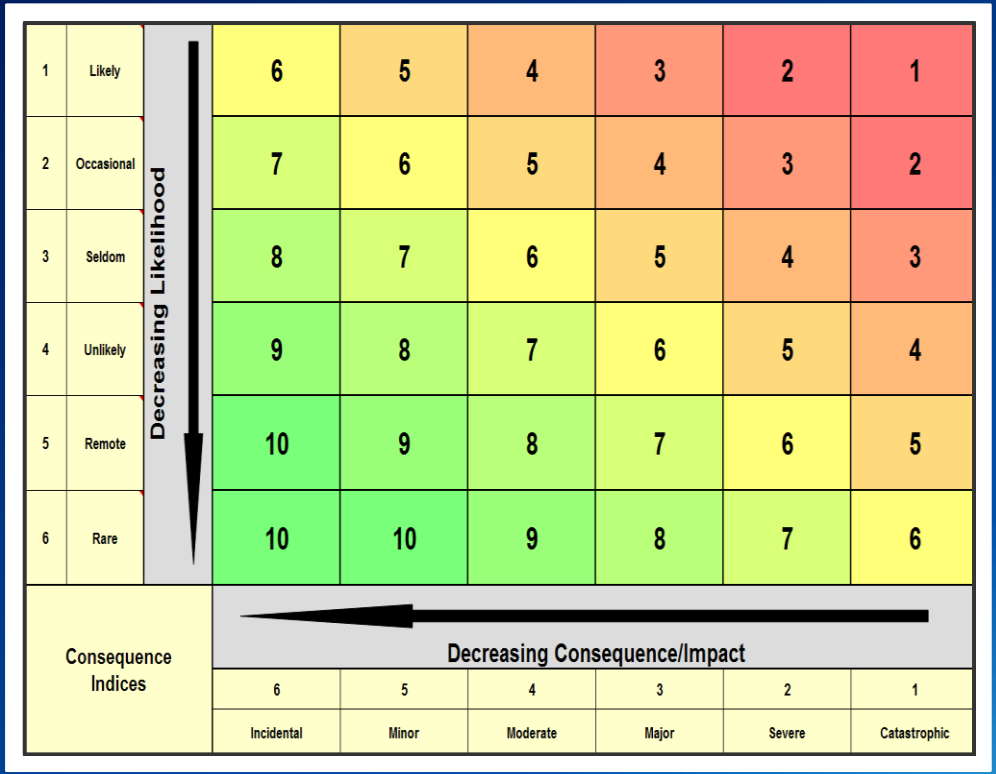
Scalable Risk Assessment Approach



Qualitative Studies

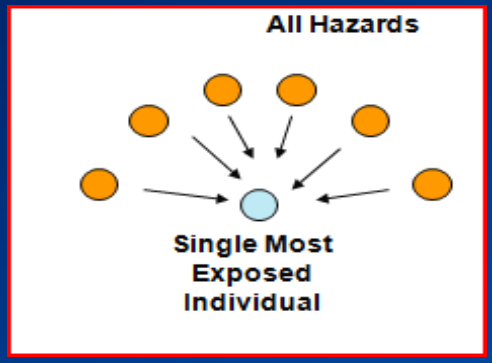
- IHAZID
- Checklists
- What-if checklist
- HAZOP (HAZard and OPerability) Study
- HAZOP - Safety Objectives Analysis / Layers of Protection Analysis

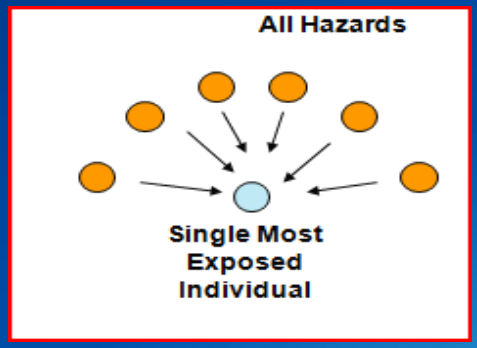
- Other qualitative reviews (layout studies, essential system survivability analyses [ESSAs], etc.)



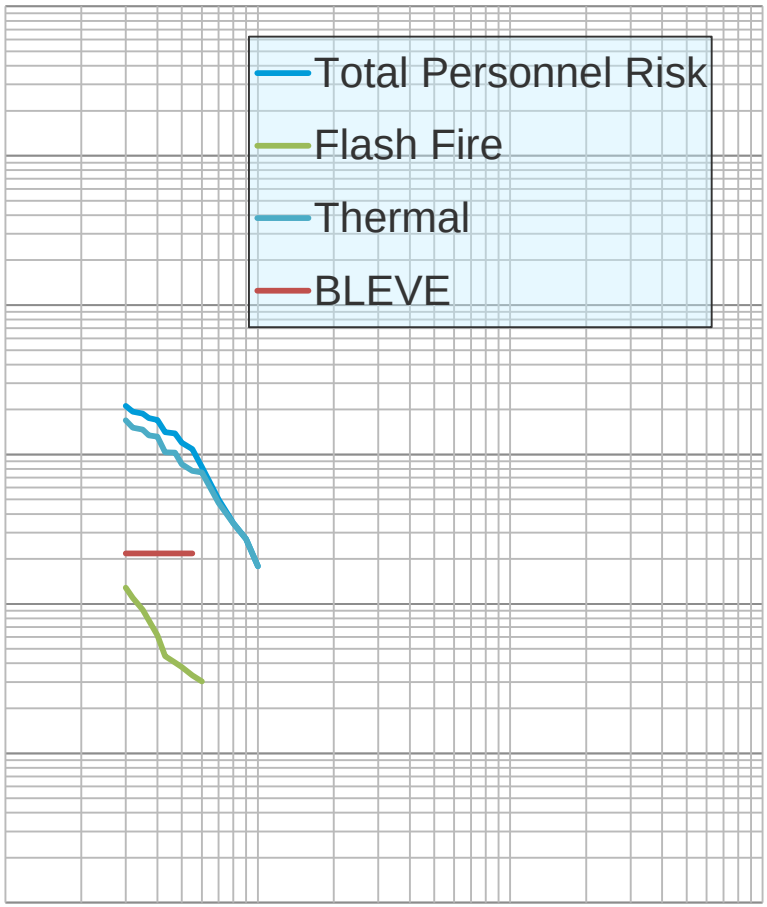
Quantitative Risk Criteria – Basic Parameters

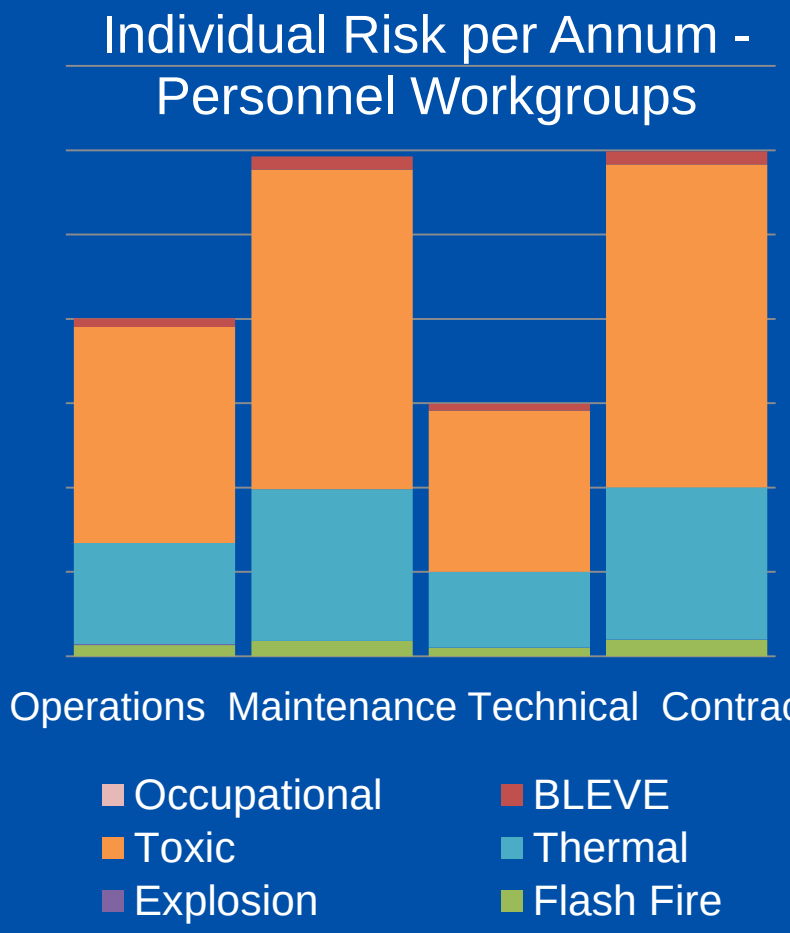
- ***Individual Risk*** represents the likelihood that a person will sustain a fatal injury from all of the hazardous events to which he or she may be exposed. Presented as a frequency number (fatalities/year). Individual risk ensures that each person is not exposed to an aggregation of different risk exposures, the sum of which leads to an overall high risk exposure for the individual.
- ***Societal Risk*** represents the number of people who may be killed by large, single events and how often those events might occur. Presented as F-N Curves (plots depicting the frequency "F" of exceeding "N" or more fatalities) which set:





Quantitative Studies





Corporate Requirements

- Undertake periodic HES risk assessments of all existing facilities, activities and capital projects.
- Follow the RiskMan2 procedure including the use of Qualified Facilitators and Environmental/Health/Social Facilitators and other competent personnel.
- Maintain and implement a plan for conducting assessments consistent with the Corporate implementation timeline.
- Maintain and implement an HES risk-reduction plan and document closure of all recommendations.
- Revalidate assessments at a minimum of every five years.
- Provide representative HES risk-assessment documentation to the Risk Management Center of Excellence for quality assurance review.
- Submit an OPCO annual summary report.

Learnings at the Facility Level

Process has provided a solid foundation

- Assessments support that our OEMS provides effective safeguards
- Information is being used effectively in design

Areas of focus for continuous improvement

- Qualitative assessment quality
- Driving consistent risk reduction

Context for Risk Decision Making