

Reliability and D&RA



You can get there from here!

Background



- Conoco participates in the Independent Project Analysis benchmarking study.
 - Improve capital effectiveness
 - Link project practices to business value
 - Implement new tools into work processes
 - Improve project engineering competencies

Background



- Improve capital effectiveness (IPA)
 - Low Cost
 - Fast Cycle Time
 - Excellent Operability (Reliability)
- Implement new tools into work processes
 - VIP's
 - Reliability Tools

Reliability Tools



- Classes of Facility Quality
- Process Simplification
- Value Engineering
- Technology Selection
- Process Reliability Modeling
- Standards and Specifications
- Design to Capacity
- Predictive Maintenance
- Constructability
- Historical Failure Data
- Reliability Block Diagrams
- Checklists
- Critical Issues Review
- Life Cycle Costs
- D&RA
- Maint. & Operability Reviews
- Criticality Analysis
- FMEA
- HAZOP
- Materials Review
- Reliability Centered Maintenance
- Fault Tree Analysis

Reliability Tools



- So many choices, so little time.
 - Keep the end in mind
 - Start simple
 - Focus on just 2 or 3 tools

Reliability Tools



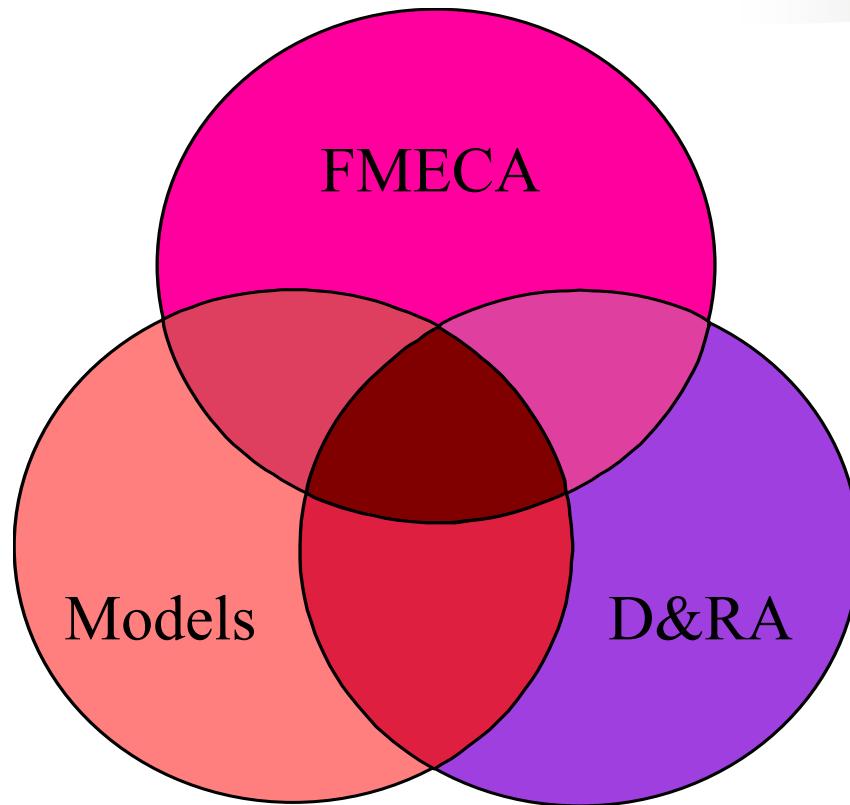
- Keep the end in mind.
 - The goal is to improve reliability through better decision making.
- Start simple (learn to crawl)
 - Don't try to tackle an entire refinery
- Focus on 2 or 3 reliability tools
 - Select tools that can pick the “low hanging fruit”

Which Reliability Tools?



- FMECA
 - Failure Modes, Effects and Criticality Analysis
- Reliability Modeling
 - Historical Failure Data
 - Reliability Block Diagrams
 - Block and Discrete Modeling (software)
- Decision & Risk Analysis

Reliability Tools



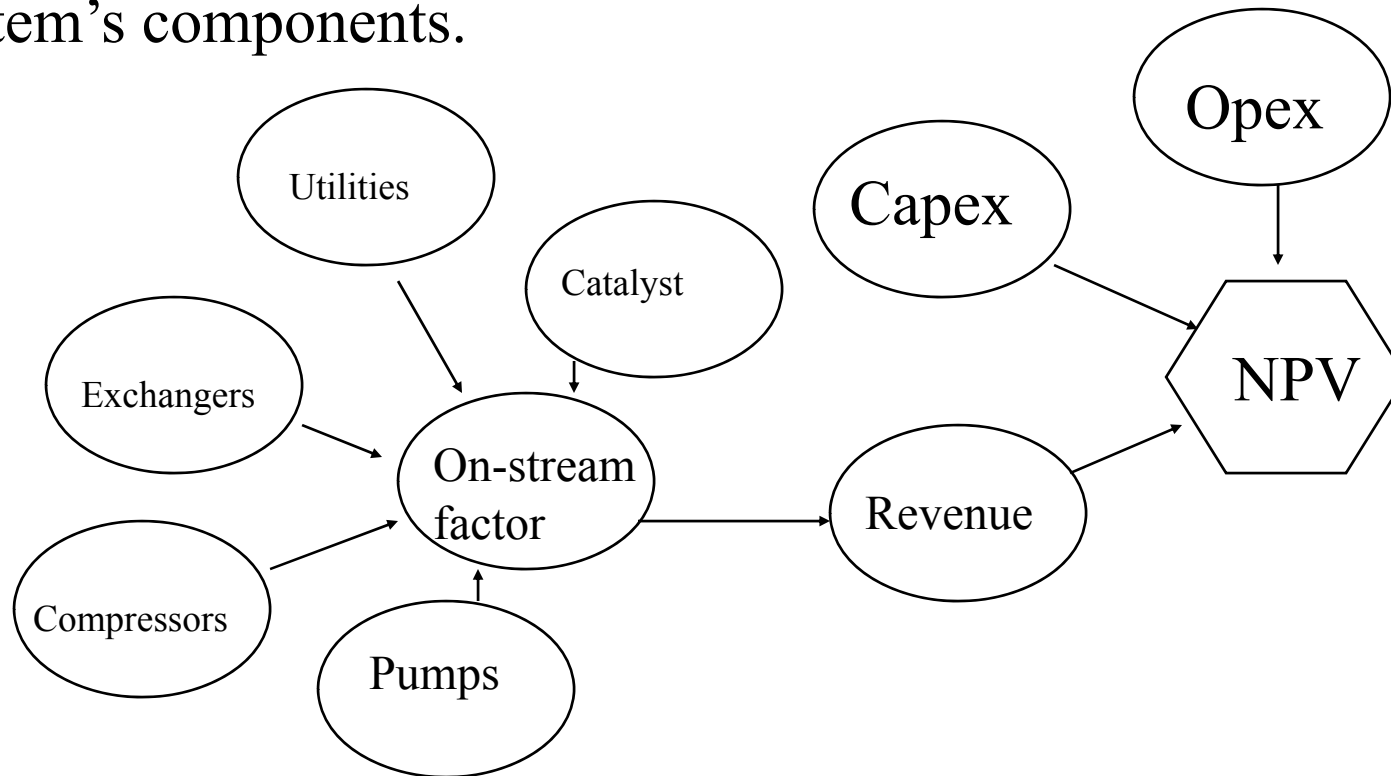
Reliability Tools



- Why choose FMECA, Modeling and D&RA?
 - FMECA develops the basic information needed to populate a reliability model.
 - Reliability Models facilitate a structured dialogue on the merits and liabilities (focused on the assessment of probabilities) of options.
 - D&RA combines the probabilities and consequences to assess the total risk.

Reliability Tools

The On-stream Factor is dependent on the reliability of the system's components.



Reliability Tools



- On Stream Factor and Availability can have the same definition.
- Availability is one of the outputs of a reliability model.
- FMECA allows the maintenance and operations staff to input “real” equipment reliability data into D&RA (not vendor estimates or dissimilar service data).

Summary



- D&RA can be integrated with FMECA and Reliability Modeling.
- The FMECA/RM/D&RA work process allows many levels of an organization to own the final results of a D&RA.
- The quality of the D&RA results is improved through this work process.