Schedule Risk Analysis

Mini Masterclass

Content

1. Software
2. Schedule Risk Analysis
   - Schedule Sense Check
   - Duration Uncertainty Inputs
     - Correlations
   - Risk Inputs & Modelling
     - Distributions
3. Monte Carlo Risk Analysis
4. Results
   - What If / Stress Test
5. Benefits

Software

Schedule Risk Analysis

Software

Palisade @Risk

- Excel Based
- MSP
- SRA Limitations
- Cost Focused
- Significant

Oracle Primavera Risk Analysis

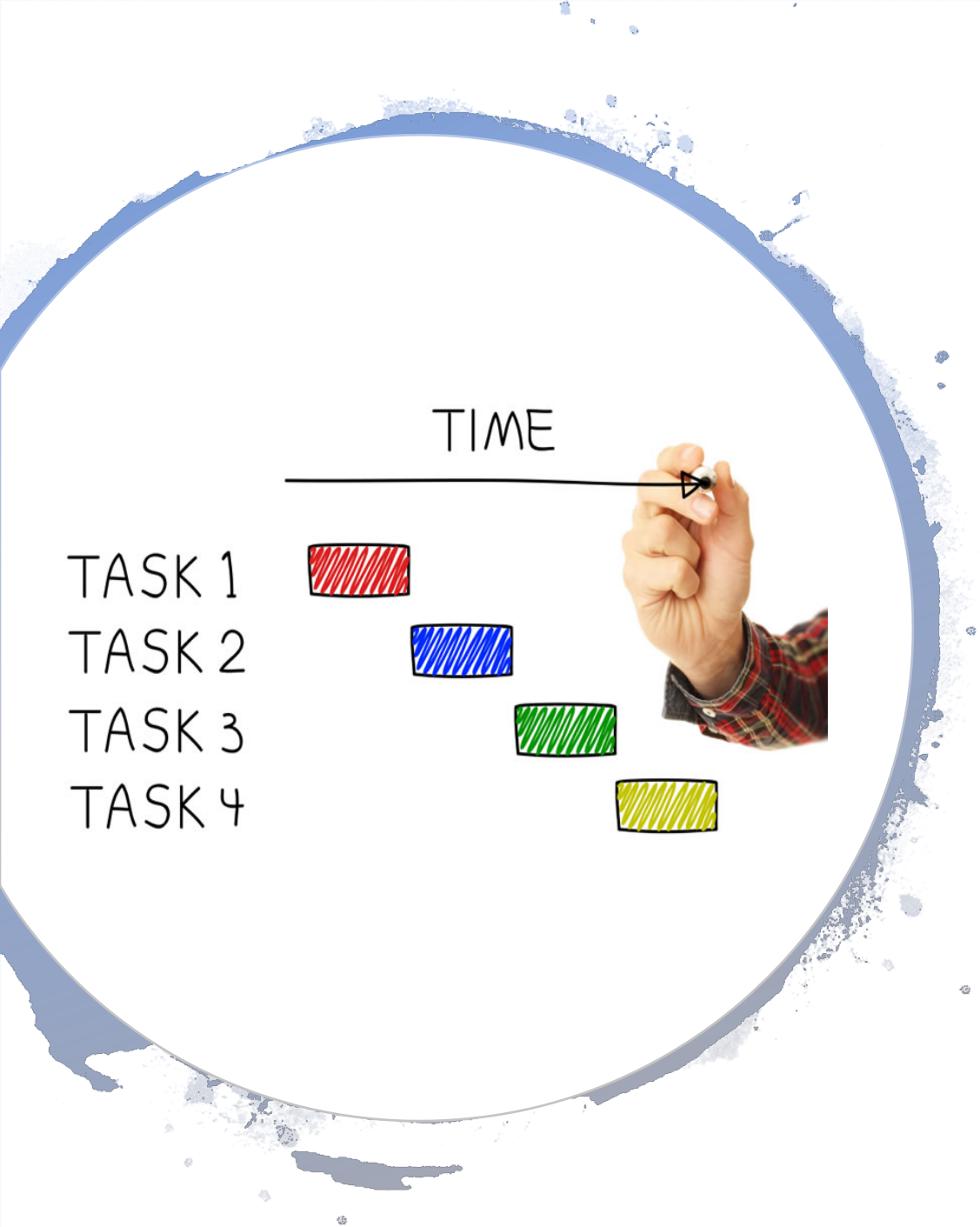
- Primavera, MSP, Others
- Manipulate Plan
- Large Schedules
- Limited Distributions
- Limited cost function

Schedule Risk Analysis

What is it?

Schedule Risk Analysis

- Software
- Schedule
- Risk & Uncertainty Analysis

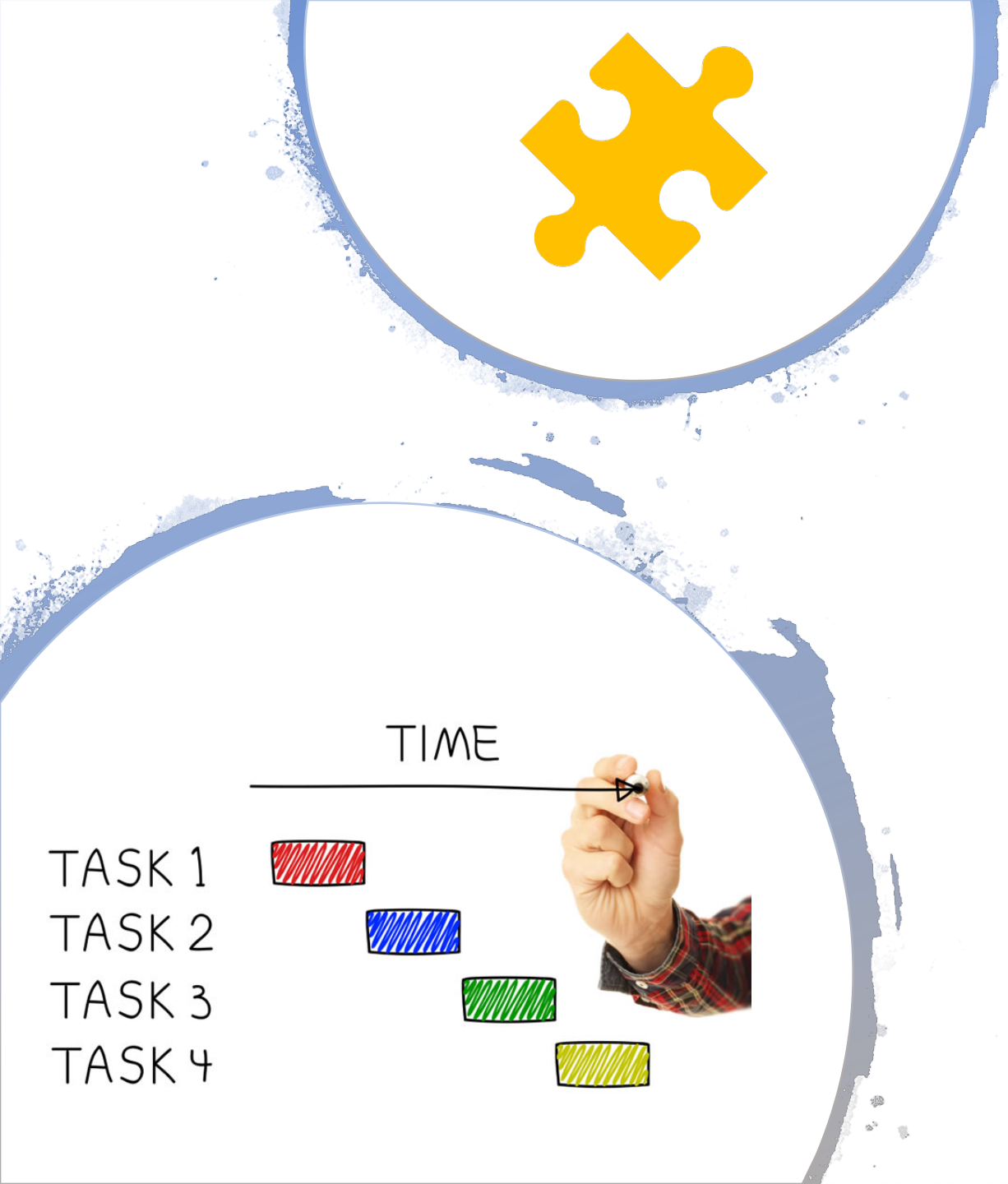


Project Schedule

- A Project Schedule is a dynamic representation of the project activities and their execution sequence.
- Dynamic Model – Not a Calendar
- Completion dates should be <u>OUTPUTS</u> not inputs

Why do we schedule a project?

- Plan out activities to understand **realistic** targets
- Understand resource requirements
- Forecast and record performance
- Compare performance against targets (baseline)
- Understand dynamics of plan and identify changes required to meet targets etc



Build A Schedule

Group Task

- Build This Hotel
- Less than 10 Activities
- Durations
- Logic Links

Schedule Sense Check

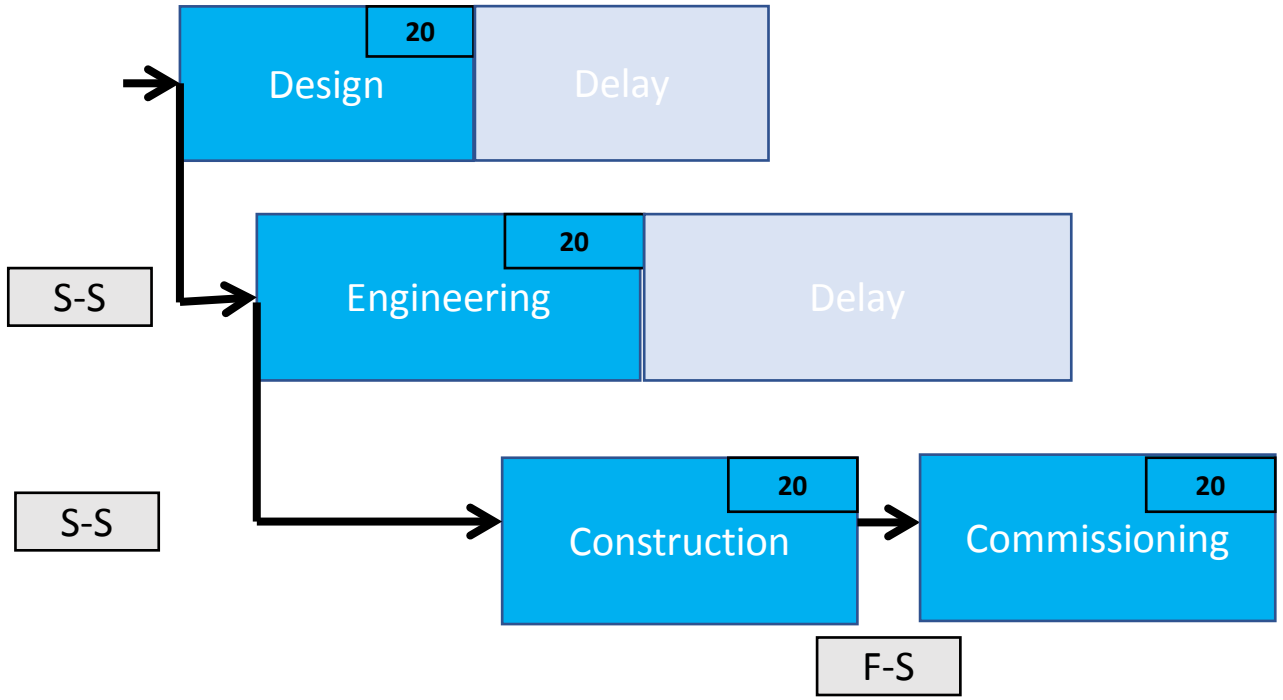
What is it?

Project Schedule Best Practice

- Define WBS
- Set consistent coding strategy
- All tasks have dependencies
- No constrained dates (or Minimum use if legit)
- Activities based on work/durations not dates
- Realistic durations
- Realistic relationships
  - Not date driven
  - No lags or negative lags

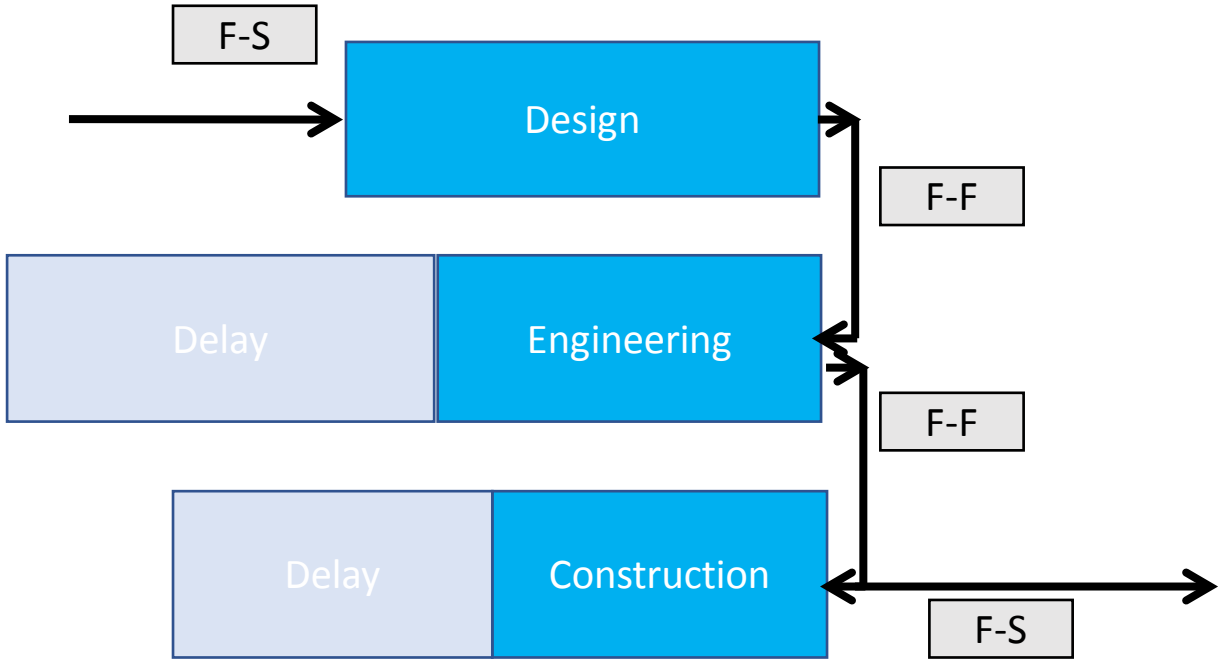
Schedule issues

- Start to Start with Open End

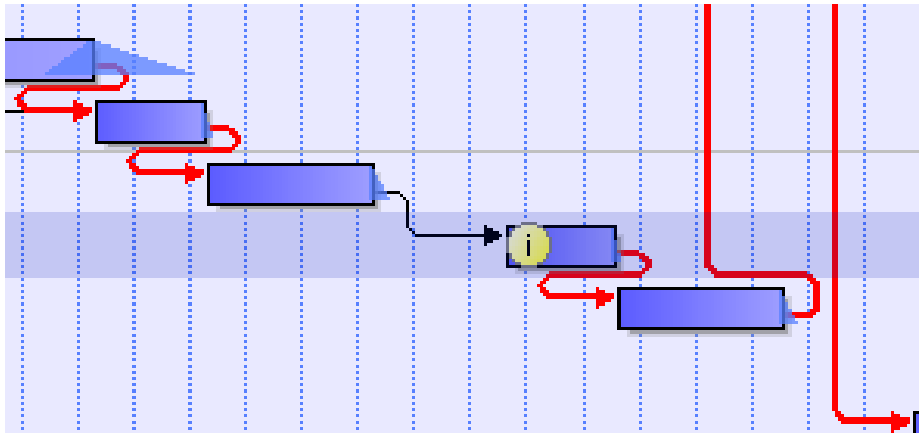


Schedule issues

- Finish to Finish with Open End



- Engineering completion becomes constrained by Design and Construction constrained by Engineering



Constraints

- Often used to set dates
  - Targets, contract dates, management dates
  - This is incorrect use and poor planning
  - ‘looks fine’ but negative float builds up
- Constraints can be legitimate
  - Date land access is to be granted
  - Date Vendor/Sub-Con has agreed to start
  - Resource leveling constraints
- Completion dates are OUTPUTS not inputs

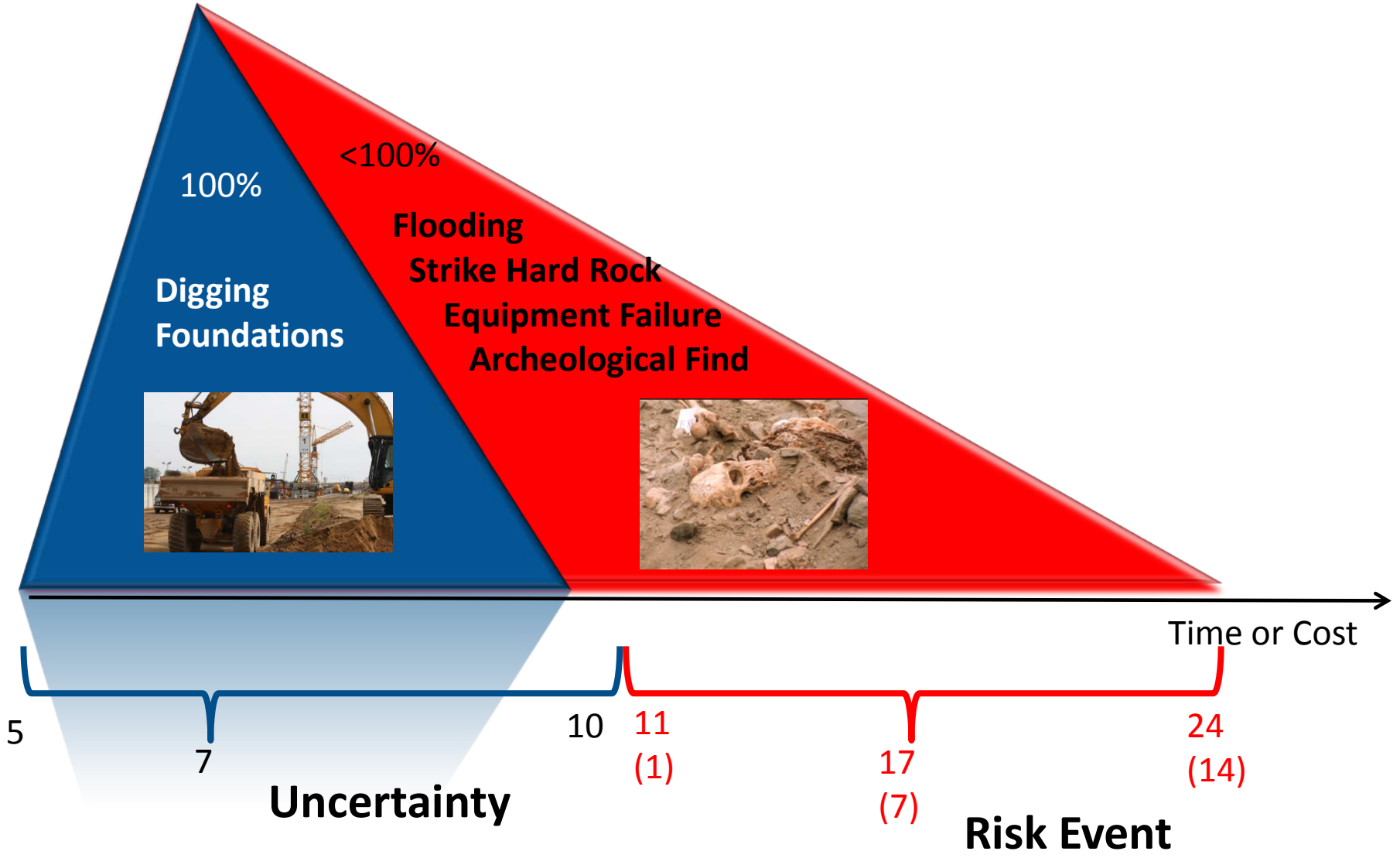
Duration Uncertainty

Building A Model

Duration Uncertainty

- Review Activity Durations
  - Are they realistic?
  - Optimistic? Pessimistic?
  - Durations are not always certain
  - Activities have natural variance.
  - 3 point range for better accuracy. Min, Most Likely and Maximum durations
- Interview/Workshop with Planner, PM, Eng etc

Risk & Uncertainty



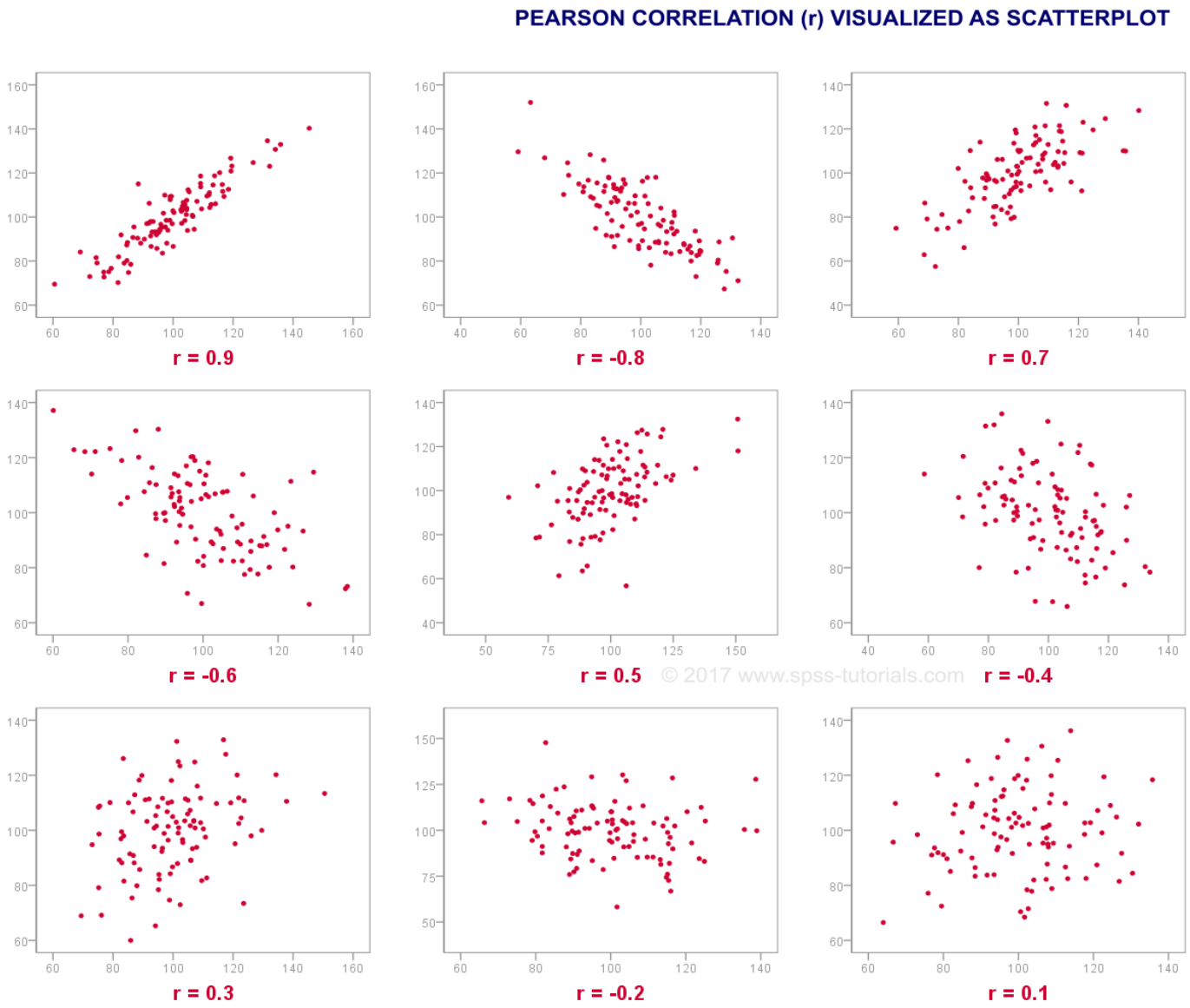
Estimating Impacts

H&S? Reputation? Quality? Environment?

Group Task

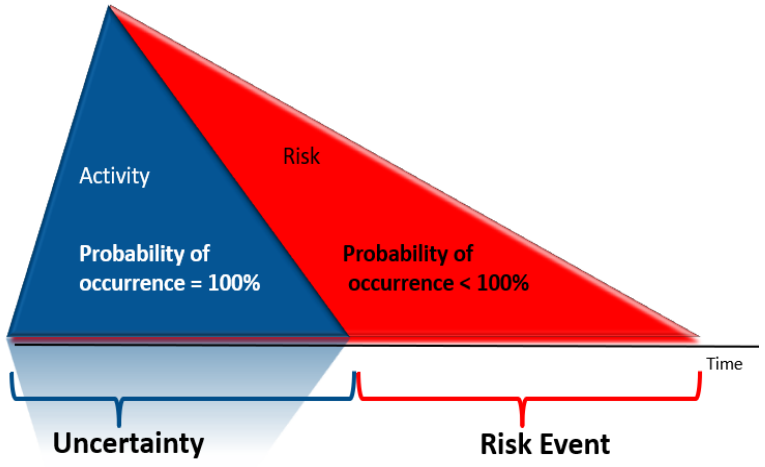
- Build Uncertainty in your durations

Correlations



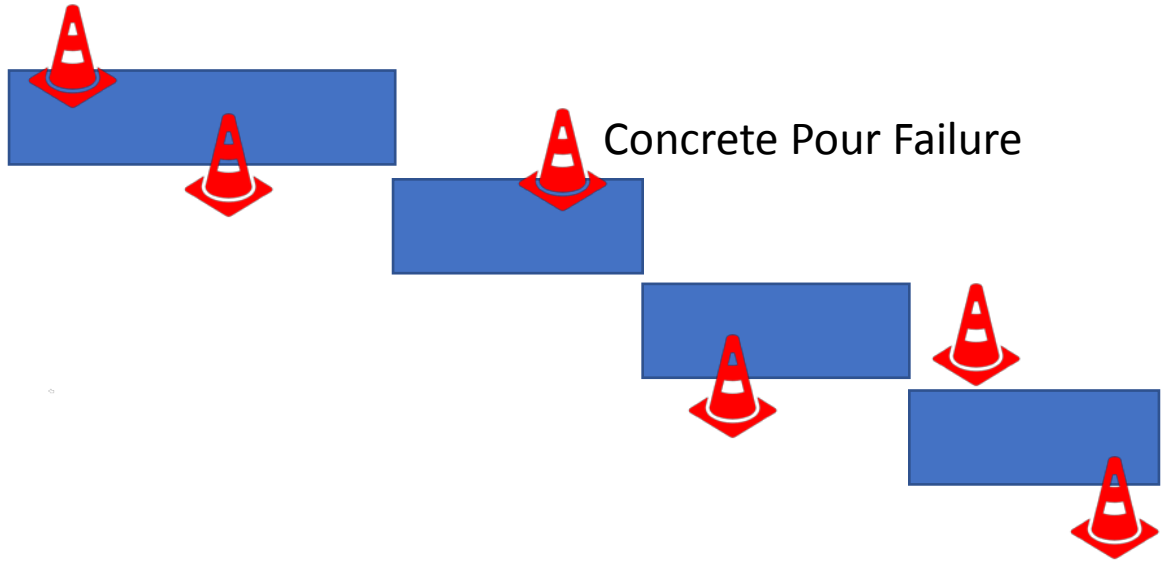
Risk Inputs

Identify & Quantify



Group Task

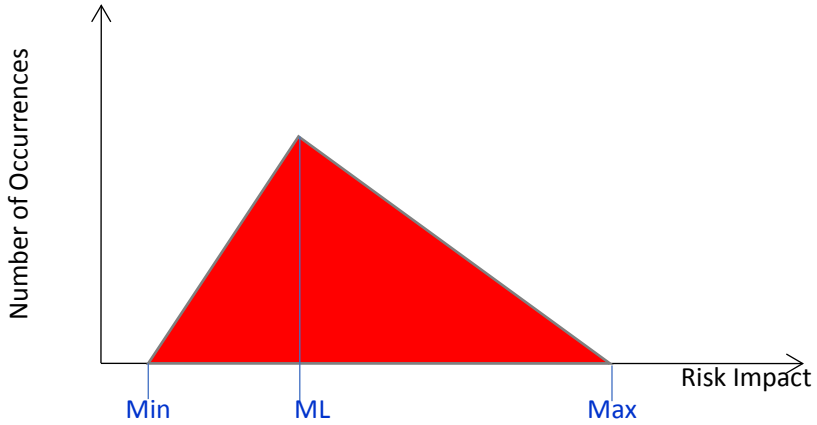
- Identify Risks



Quantifying Risk Events

- Each Risk given a Min,

Most Likely & Max impact

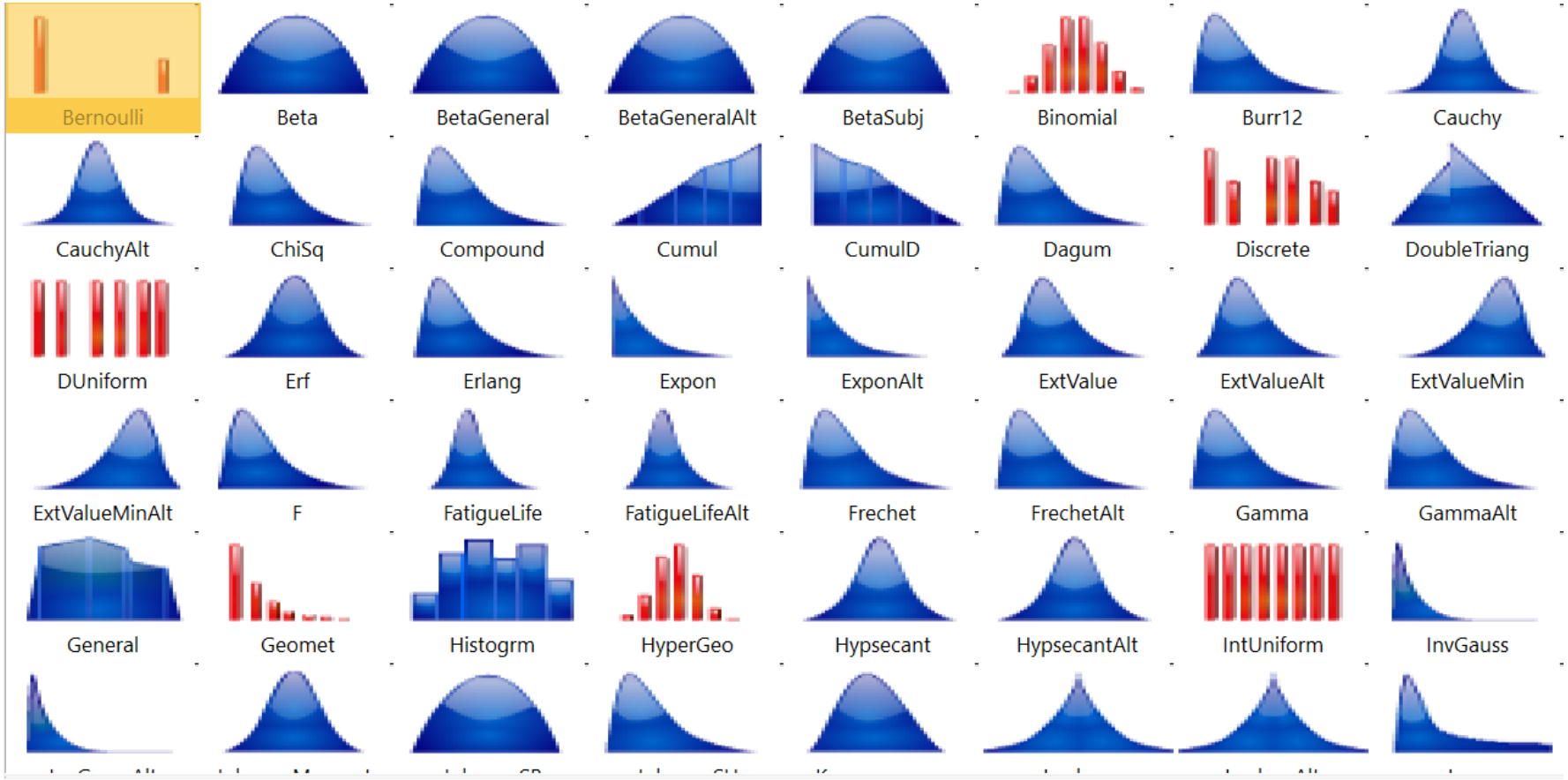


- Min = Optimistic but realistic outcome
- Most Likely (ML) = Expected most probable outcome
- Max = Pessimistic worst case outcome
  - Should not include force majeure or project stopping outcome

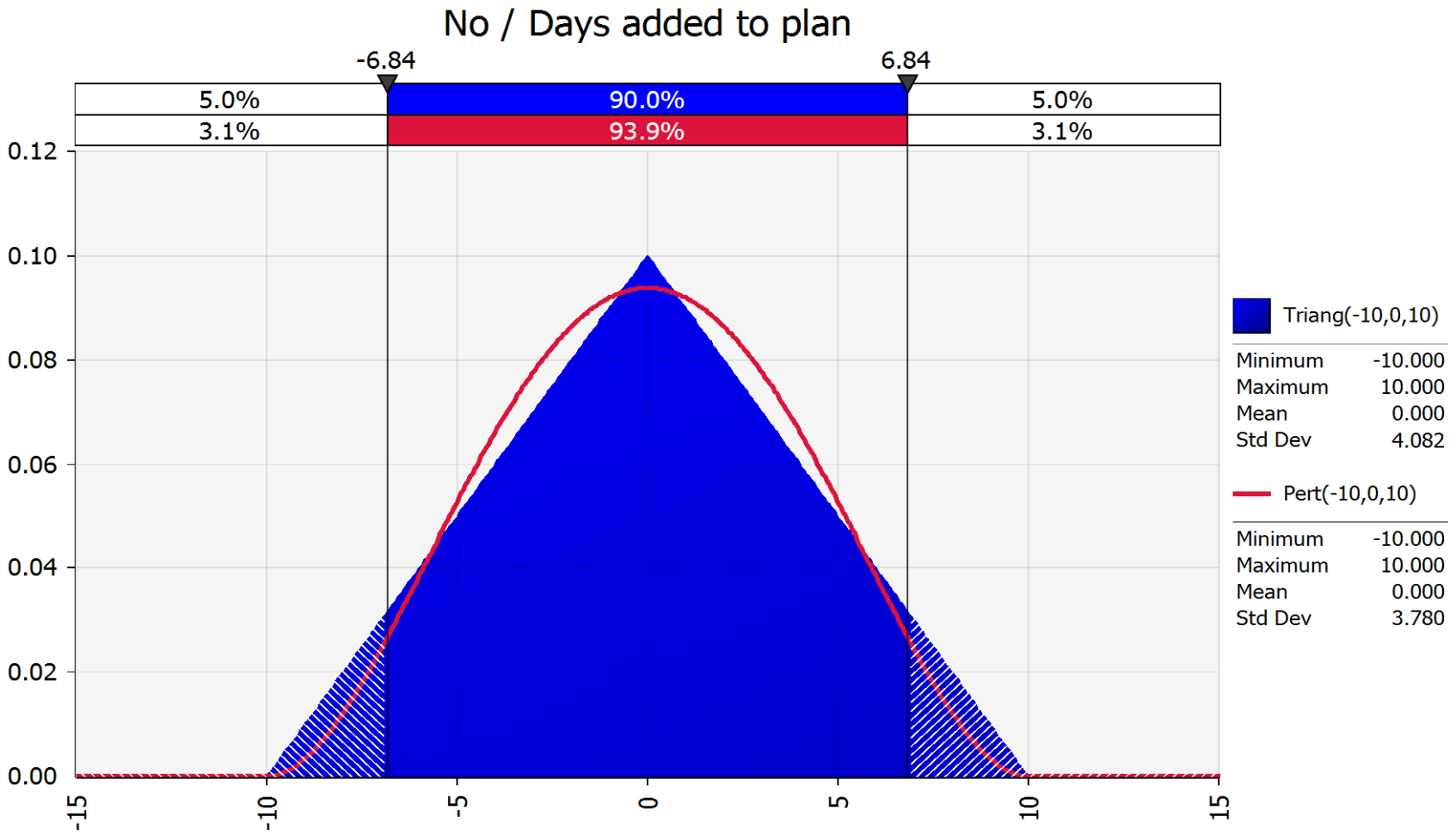
Probability	Min	Most Likely	Max
30%	1 week	4 weeks	8 weeks

Triangular Distribution

Distributions



Distributions



Monte Carlo

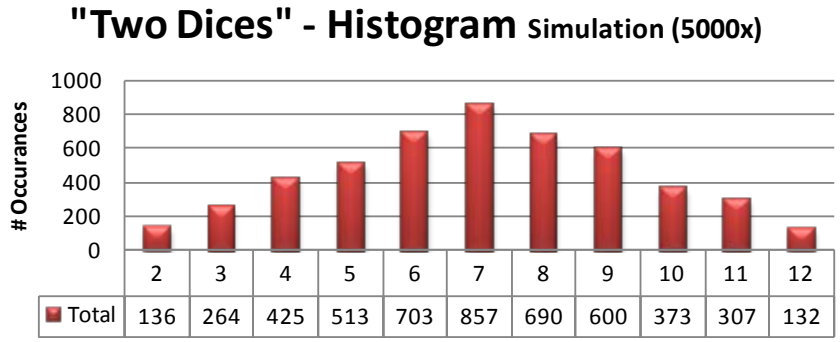
Schedule Risk Analysis

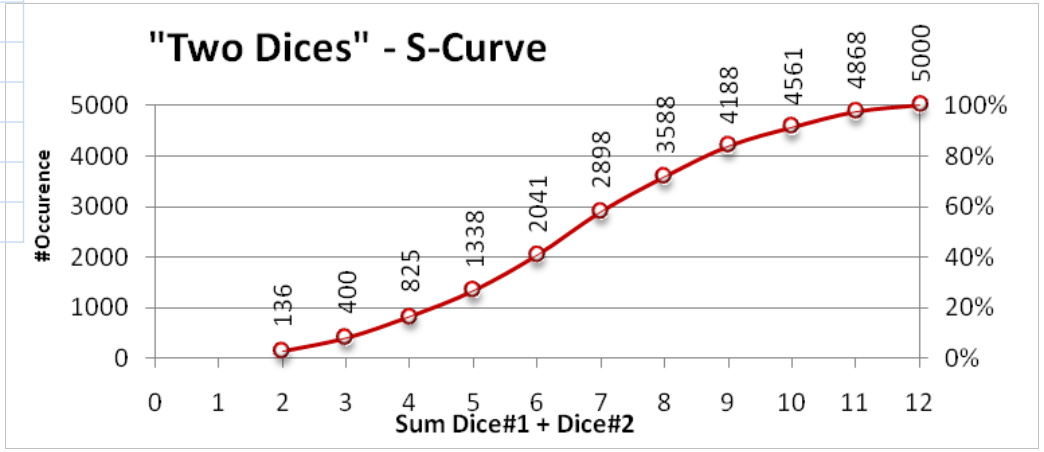
Quantitative Risk Analysis - Distribution

What is a Distribution?

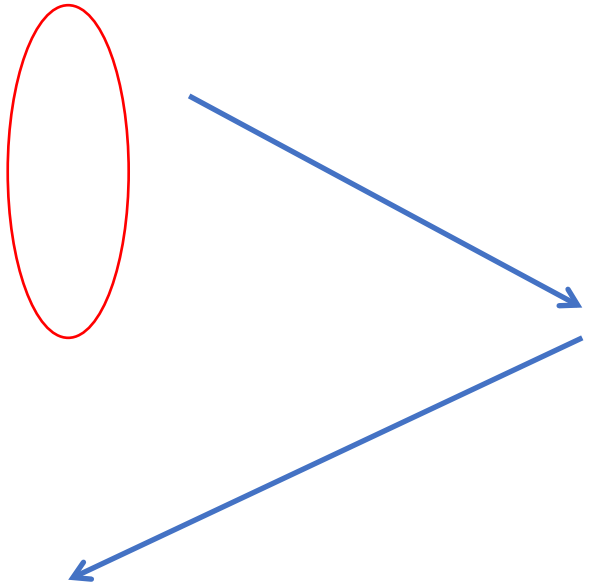
- Graphical representation of occurrences of a variable, e.g. cost, duration, date, etc.
- Example: “Two Dice”

Sum Dice#1 + Dice#2	# Occurrences Dice#1 + Dice#2	Combinations	# Comb.
2	136	1+1	1
3	264	1+2; 2+1	2
4	425	1+3; 3+1; 2+2	3
5	513	1+4; 4+1; 2+3; 3+2	4
6	703	1+5; 5+1; 2+4; 4+2; 3+3	5
7	857	1+6; 6+1; 2+5; 5+2; 3+4; 4+3	6
8	690	2+6; 6+2; 3+5; 5+3; 4+4	5
9	600	3+6; 6+3; 4+5; 5+4	4
10	373	4+6; 6+4; 5+5	3
11	307	5+6; 6+5	2
12	132	6+6	1
Grand Total	**5000**		





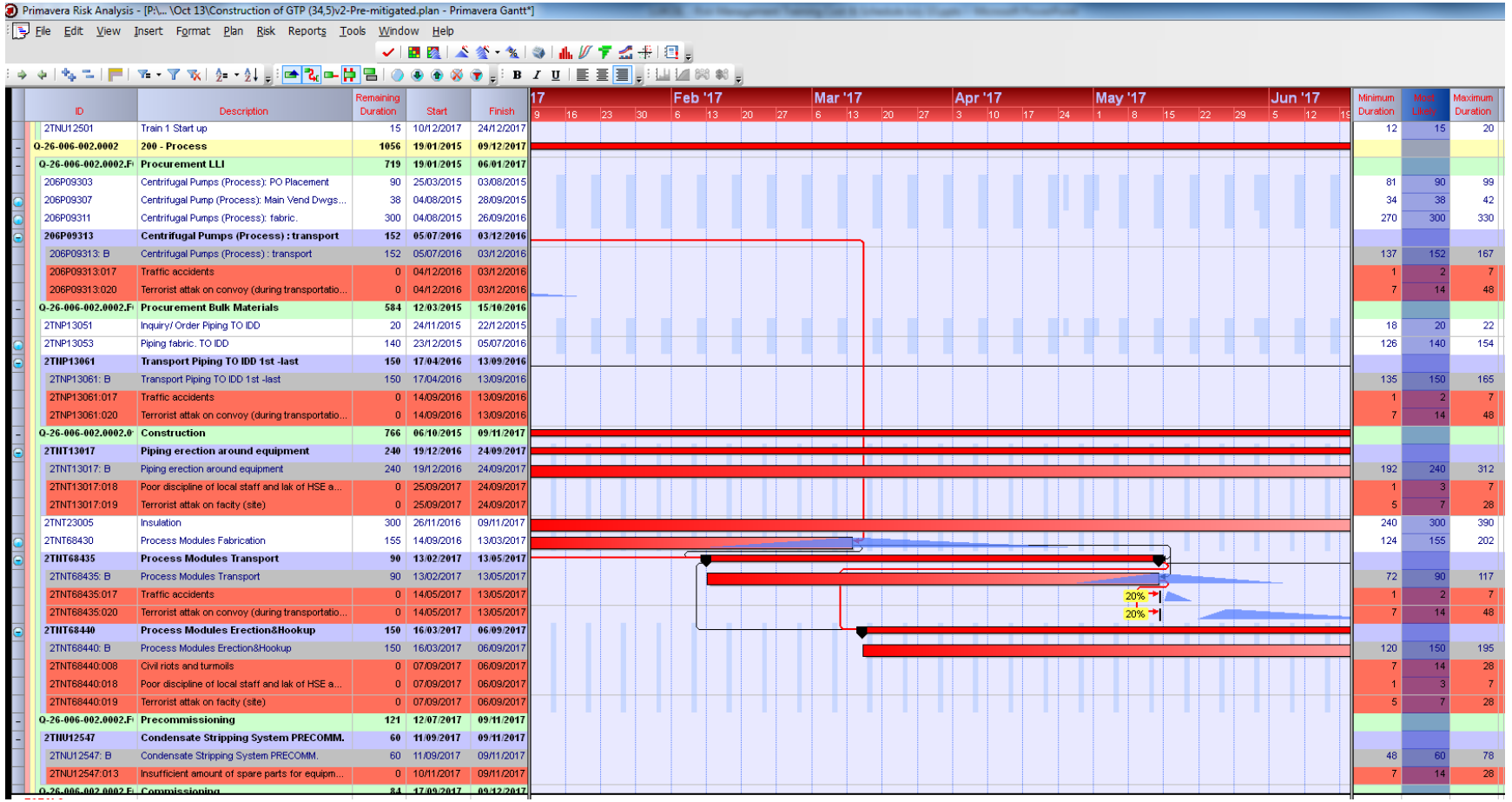
Schedule Risk Analysis (SRA)



- Risk Mapping to Plan
- Can be multiple activities
- Entering Schedule Delay impacts (Min, ML, Max)

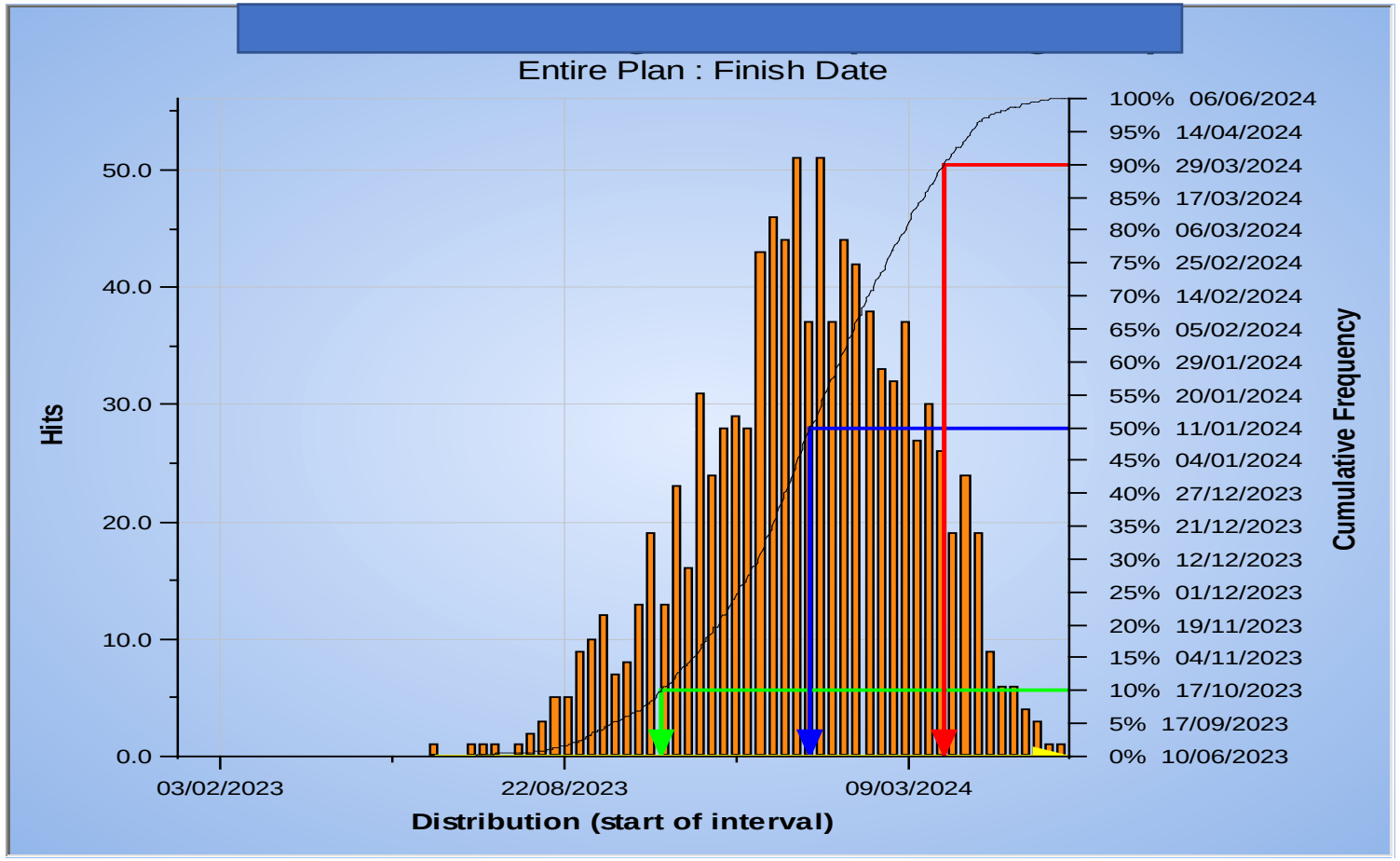
Schedule Risk Analysis (SRA)

- Duration Uncertainty + Assigned Risks



Schedule Risk Analysis (SRA)

- Montecarlo Analysis plots potential finish dates for each activity/milestone over 1000 iterations and creates an S-curve of probabilistic outcomes.



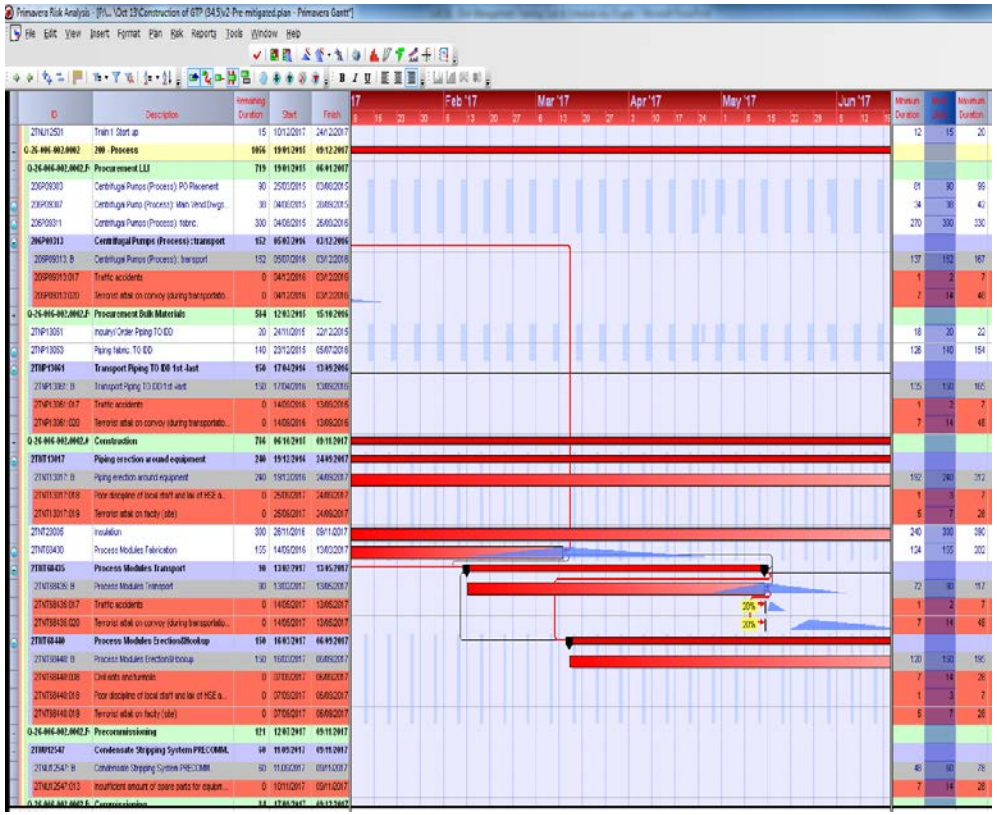
Schedule Risk Analysis (SRA)

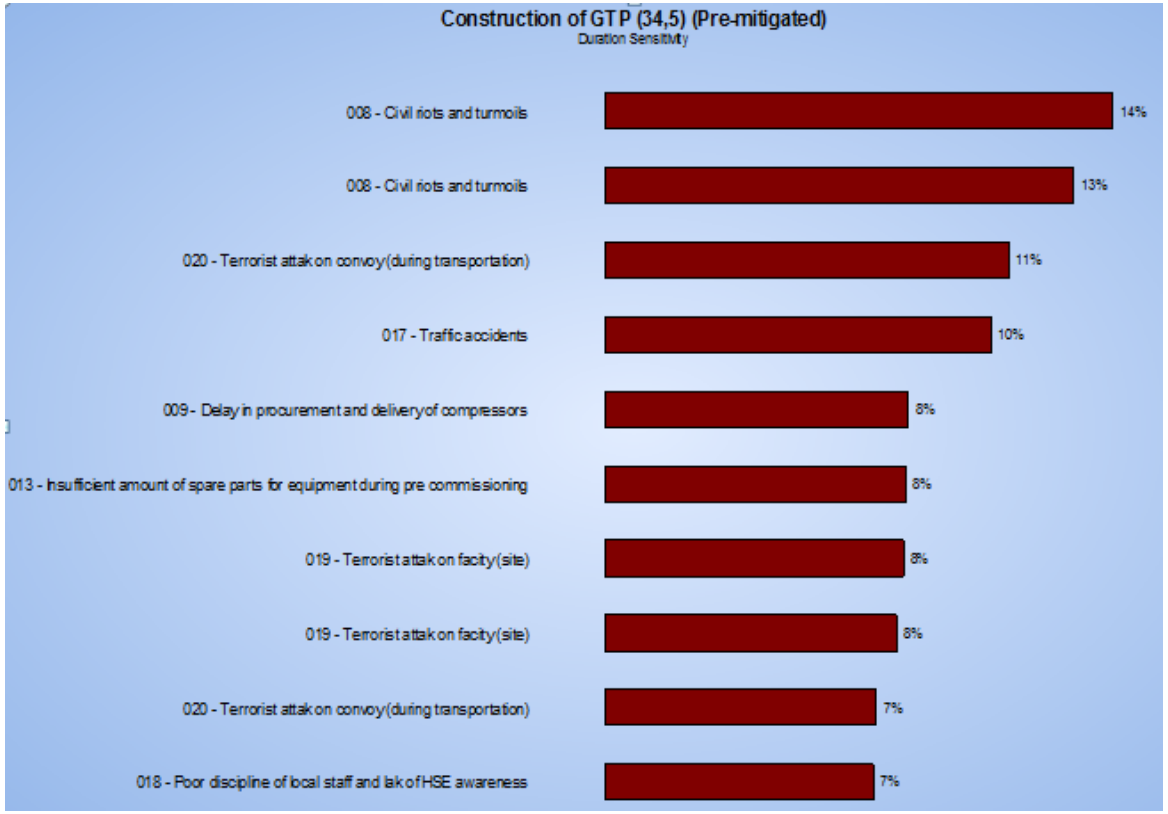
- Analysis calculates the **probabilistic** (Not actual) completion dates of milestones/activities

- Therefore P50, P90 etc are created from statistical outputs of 5000 different randomly generated outcomes based on input data.

Schedule Risk Analysis (SRA)

- Top Risks & Top sensitive Activities Identified
  - These can then be areas of focus for improvement and mitigation
  - These can named or omitted on Insurance policies





Schedule Risk Analysis (SRA)

- “What If” Scenarios
  - Tool to understand effect of mitigations and schedule changes
- Change Risk Profile and Run analysis to understand effect of mitigation of key risks
  - Omitted risks etc
- Value Management
  - Option Selection/analysis
  - Identify key activities (Critical and Duration)
  - Change Schedule (parallel working, additional resource, reduced scope etc)
  - Reduce Schedule

Post Mitigated / Target

- Pre and Post mitigated probabilistic S-Curves

Benefits

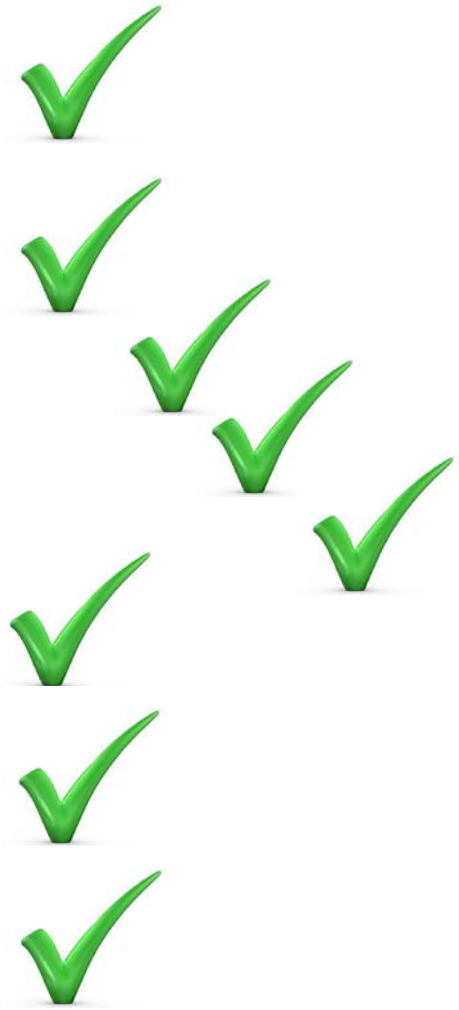
Projects

Project Benefits

- **Key to ensuring project success**
  - Identification of project interdependencies
  - Management of Risk to allow project completion of time and on budget
  - Helps control the cost of a project
  - Validation of Project Information
  - Fosters a Clear Understanding of Challenges ahead
  - Improved Project Communication
  - Improved Schedule / Cost Performance

Content

1. Software
2. Schedule Risk Analysis
   - Project Schedule Review
   - Duration Uncertainty Inputs
     - Correlations
   - Risk Inputs & Modelling
     - Distributions
3. Monte Carlo Risk Analysis
4. Results
   - What If / Stress Test
5. Benefits



Training Courses

- Project Risk Management
- Quantitative Risk (Cost & Schedule)
- @Risk Software

Public & In House

Thank you