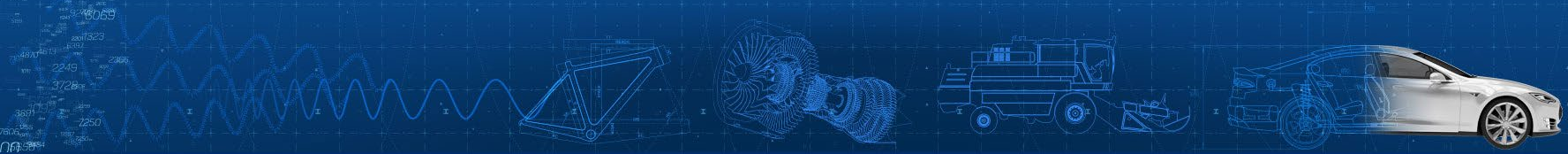


2019 Prencia User Group Meeting | April 30th – May 1st | Novi,MI (USA)



XFMEA Risk Discovery Drives System FMEA plan

Mani Vedanayagam

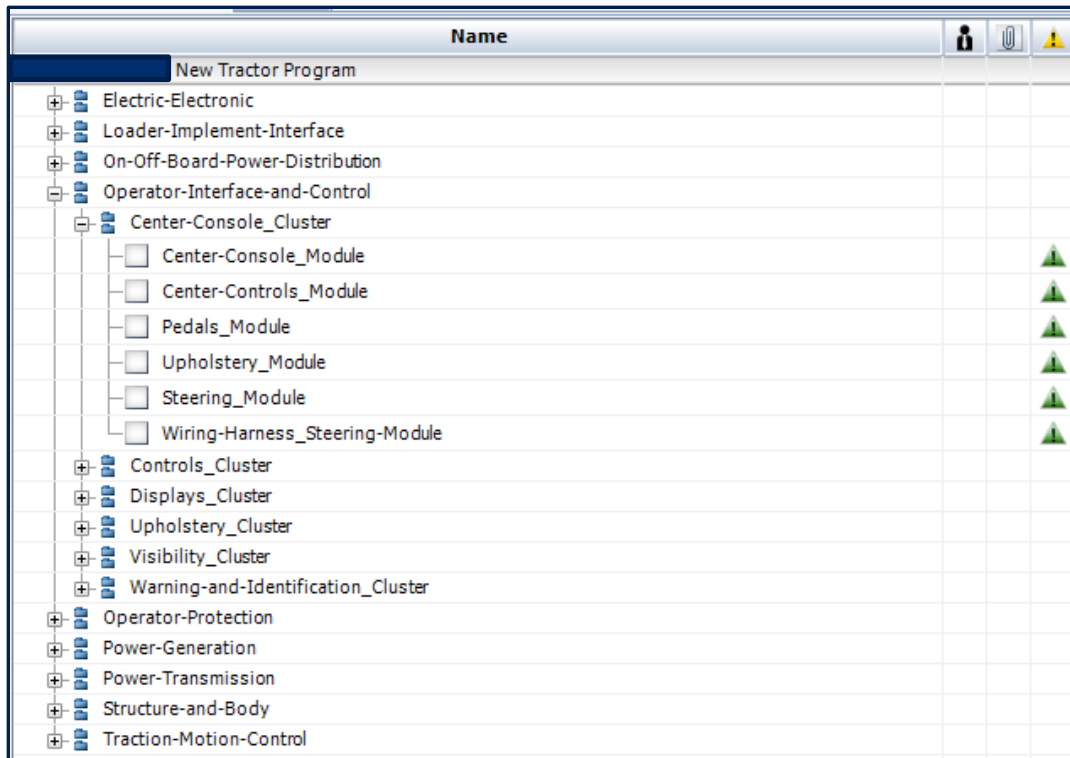
Senior Reliability Engineer



Our Purpose: Committed to Those Linked to the Land

- Agriculture and Turf Division
- Construction and Forestry
- Power Systems
- Financials

- Risk Assessment of all Tractor System and Sub System ≈ 150 Modules
- Identify Modules for System FMEA
- Initial Preparation for System FMEA (Parameter Diagram and System Boundary Diagram)
- System FMEA



- Configured Risk Discovery Ratings to match Requirement.
- Carried out Risk Discovery Assessment with Systems Engineer.
- Rating Option and Overall rating prioritized SFMEA projects.

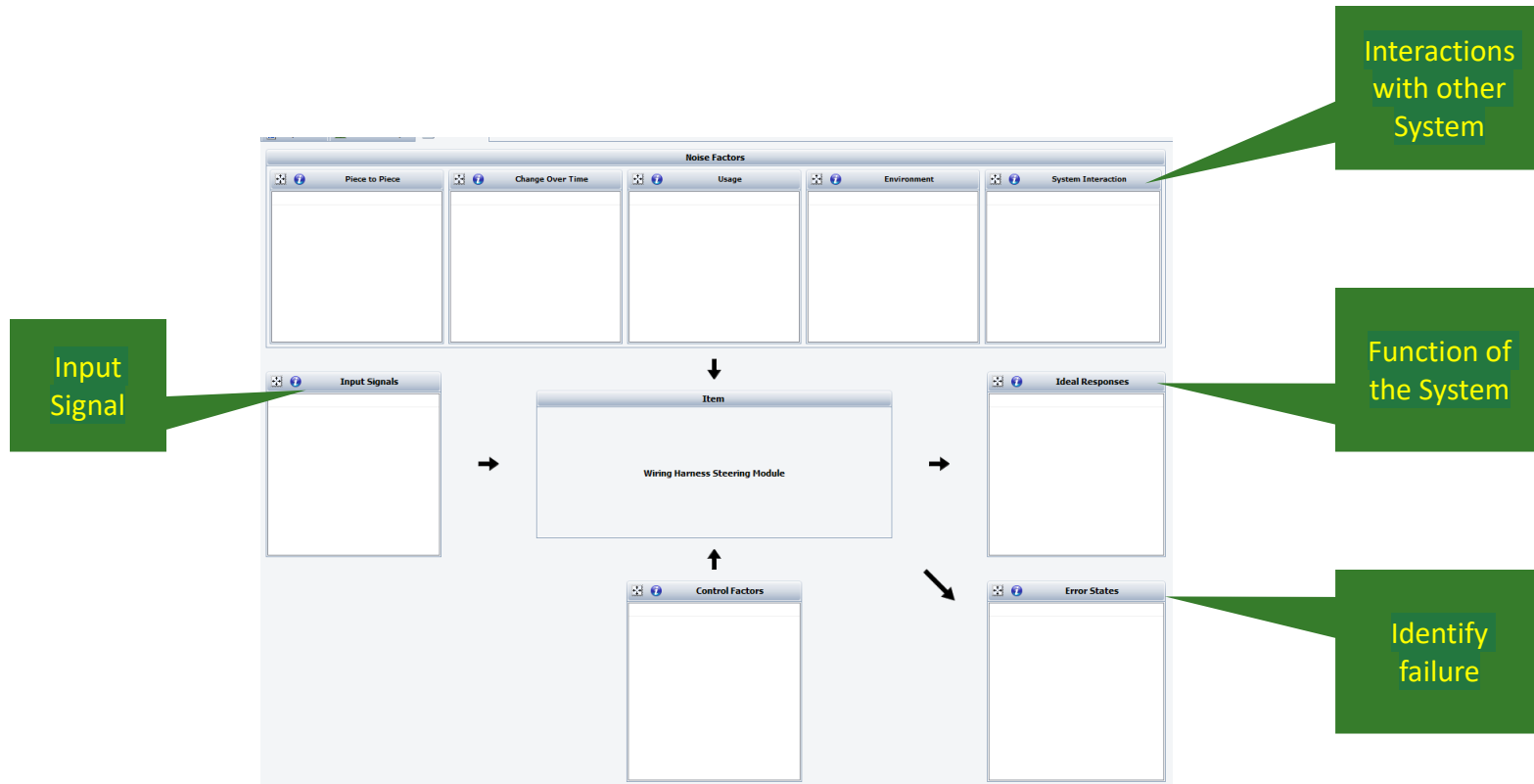
RD using XFMEA

Calculation Methods			
Item	Sum	Category	Sum
Category	Factor	Option	Rating
Potential Risk Factors	New Technology	Lower Risk	1
		Moderate Risk	2
		Higher Risk	3
	New Application	Lower Risk	1
		Moderate Risk	2
		Higher Risk	3
	Historical Problems	Lower Risk	1
		Moderate Risk	2
		Higher Risk	3
	Safety Issues	Lower Risk	1
		Higher Risk	3
	Regulation Issues	Lower Risk	1
		Moderate Risk	2
		Higher Risk	3

RD using Excel Sheet

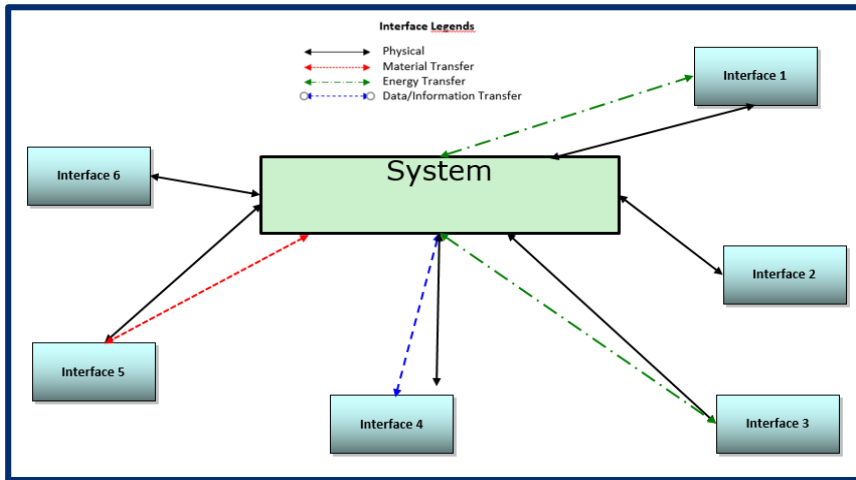
Project:				
Date:				
Evaluation Team Leader:				
Evaluation Team:				
	Highly Engineered Changes to Existing Technology	New Technology	Has the Application become more severe	Downtime Risk
Component	Technology	Technolo	more severe	Risk
1				
2				
3				
4				
5				
6				
7				
8				

- Initial investment for Systems FMEA
- Conducted P- diagram with Design Engineer Team
- P- Diagram carried over to FMEA
- Helped Team to focus on System functions, failure modes, causes of failure.

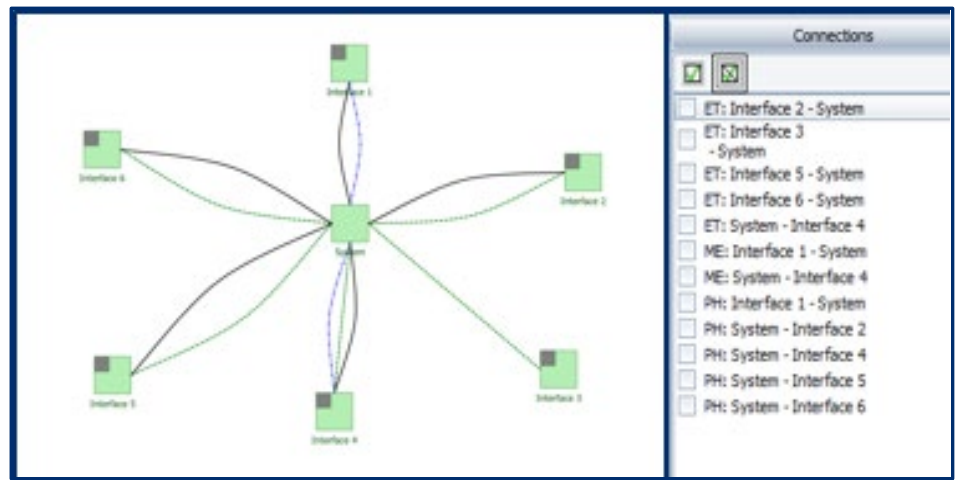


- Boundary Diagram help ascertain System and System Interactions
- Check point to identify all failures associated with connections
- Connections can be carried over to FMEA as functions but did not use the feature
- Located within FMEA
- Ease in illustrating in FMEA block diagram

Power point Boundary Diagram

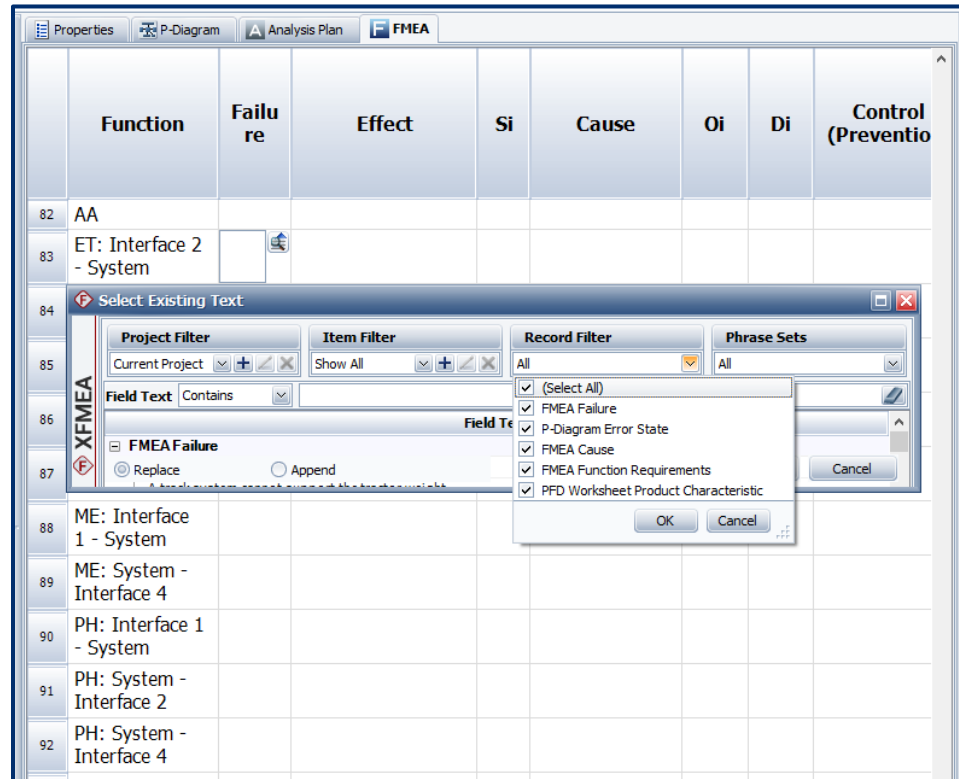


FMEA Block Diagram



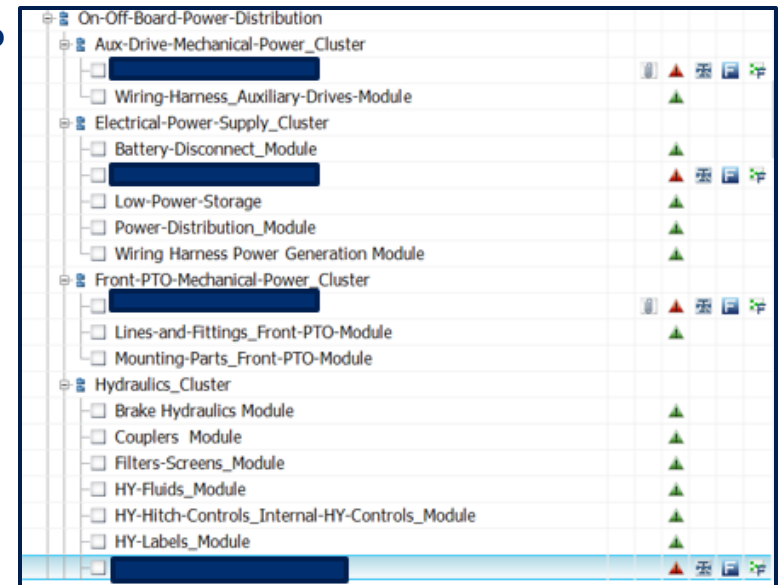
- Works with the Company email to import existing users
- Define the team
- Record work session and keep track of attendees
- Within the FMEA structure

- Risk Matrix – Identify high risk items based on RPN an high Severity ranking
- Reuse failures, effects, causes, control detection/prevention and recommended actions
- Hierarchy mode enables copying items subsequent functions, failures



- How is the product integrated as a solution?
 - Risk Discovery Assessment to identify critical modules in New tractor Program.
 - P- Diagram and FMEA block diagram(Boundary Diagram) integrates inputs to System FMEA
 - FMEA classify high risk areas and actions taken to lower risks
 - Analysis plan documents SFMEA sessions
 - All records in one location- Facilitates using FMEA across different geographical regions

- What is the added value of using the product?
 - Increased Efficiency.
 - Improved organization of FMEA records.
 - Improvement global communication



Challenge

- Identify High Risk areas for New Tractor Programs.
- Communicate high risk items
- Mitigate
- Organize

Solution

- Prioritize resources in Critical areas
- Progress within Product development

Results

FMEAs leading to Robust Design

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