



“Component/Supplier Risk Assessment” ***- a Useful Tool to Enhance the MRA Process***

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“Component/Supplier Risk Assessment Tool”

A Useful Tool to Enhance the MRA Process:

Background: *AFRL and DARPA have sponsored recent MRAs for developmental systems. These involved many components, processes, and suppliers – with critical technologies, single source dependencies, low-maturity materials and processes, and schedule challenges. **MRA efforts needed to be selective, focused, and effective to achieve system-level manufacturing risk reduction.***

A spreadsheet tool was developed and refined: *to enable an early, systematic risk assessment of key components, processes, and suppliers.*

Recommendations: *Consider this tool as a best practice for initial evaluation of component/supplier risks to selectively prioritize future MRA activities.*

“Component/Supplier Risk Assessment Tool”

Brief history and description of attributes:

Initial “Heat Map” version:

- *Developed by **Cody Grogan and Lockheed Martin** (late 2017, early 2018) for planning MRA activities in support of a developmental system.*
- *Assessment based on “Yes-No” responses to “9 key questions” from MRL Deskbook (Section 4.3, 2020 version).*
- *Successfully provoked discussion of key risks for further assessment.*
- *Key components/ suppliers were identified for focused MRA activities.*
- *Featured individual component/supplier tabs, a summary sheet, and a consolidated risk map illustrating “Likelihood-Consequence.”*
- *Refined versions of spreadsheet now used internally by L-M.*

Initial version was modified in 2020 - to provide a broadly applicable tool, compatible with the established MRA process...

“Component/Supplier Risk Assessment Tool”

Brief history and description of attributes, continued:

Revisions and improvements in 2020/2021:

- *Component/supplier tabs significantly improved for AFRL program supporting USAF MRAs (Wylie/Cowles).*
- *Tied directly to DOD Risk Management Guide and MRL Deskbook.*
- *Added “L vs C” assessment for each of the 9 questions, weighted impact scores, and a “5x5” summary for each component/supplier.*
- *User-friendly, with instructions added for generic applicability.*

Results in 2020 and 2021:

- *Exercised successfully for several large programs.*
- *Preliminary, individual risk assessments generated for each component/supplier, then consolidated at system-level.*
- *Consensus on future SA and full MRA requirements achieved.*
- *Representation of system and component risks demonstrated.*
- *Tracking of progress over time was documented.*

Example follows...

“Component/Supplier Risk Assessment Tool”

Description of Excel workbook tabs....:

Spreadsheet tabs:

- **Revision history** – table of changes and dates.
- **Overview** – brief background with objectives and guidance.
- **Instructions** – guidance and sequence for user input.
- **System Information tab** – *User input.*
- **Component/supplier tabs** – *User input.* One tab for each component/supplier, or key process.
- **Component Summary** – populated by spreadsheet based on Component/supplier inputs.
- **Consolidated Risk Rating** - populated by spreadsheet based on Component/supplier inputs.

Selected screen shots follow...

“Component/Supplier Risk Assessment Tool”

“System Information” tab example:

Company and System Information Sheet			
Company Name:	MRL WG Team		
System Name:	July 28 WG Meeting Example		
Revision #:	Rev 1		
Revision Date:	7/28/2020		
Distribution Statement			
DISTRIBUTION STATEMENT: No Distribution Statement Determined.			
System Level Weighting Factors for Key Manufacturing Questions			
Materials	Are there materials which have not been demonstrated in similar products or manufacturing processes?		
Cost	Is this item a driver that significantly impacts lifecycle cost (development, unit, or operations and support costs)? Is the technology new with high cost?		
Design	Is the item design novel or does it contain nonstandard dimensions or tolerances or arrangements?		
MFG. Process	Will the item require the use of manufacturing technology, processes, inspection, or capabilities that are unproven in the current environment?		
Quality	Does the item have historical/anticipated yield or quality issues?		
Schedule	Does this item have lead time issues or does it significantly impact schedule?		
Facilities	Does this item require a new manufacturing facility or scale up of existing facilities (i.e., new capability or capacity)?		
Supply Chain MGMT.	Does the item have anticipated or historical sub-tier supplier problems (e.g., cost, quality, delivery)?		
Industrial Base	Does the item have an industrial base footprint with critical shortfalls or is this a critical item manufactured by a sole or foreign source?		
<i>REF: page 32 DoD MRL</i>			
Category	Weighting Factor	Rationale for Deciding Weighting Factor	
Materials	11.10		
Cost	11.20		
Design	11.10		
MFG. Process	11.10		
Quality	11.10		
Schedule	11.10		
Facilities	11.10		
Supply Chain MGMT.	11.10		
Industrial Base	11.10		
Total (must = 100)	100.00		
System Critical Schedule Drivers for Consequence Estimation			
Minimum Minor schedule slip Allowable: Less than	6	Months	Enter values for the THIS program
Minimum Sub System slip Allowable: Less than	12	Months	
Program critical path affected: Less than: Cannot meet key	12	Months	
Milestones, if Slip is greater	12	Months	

Entry Fields : This Color

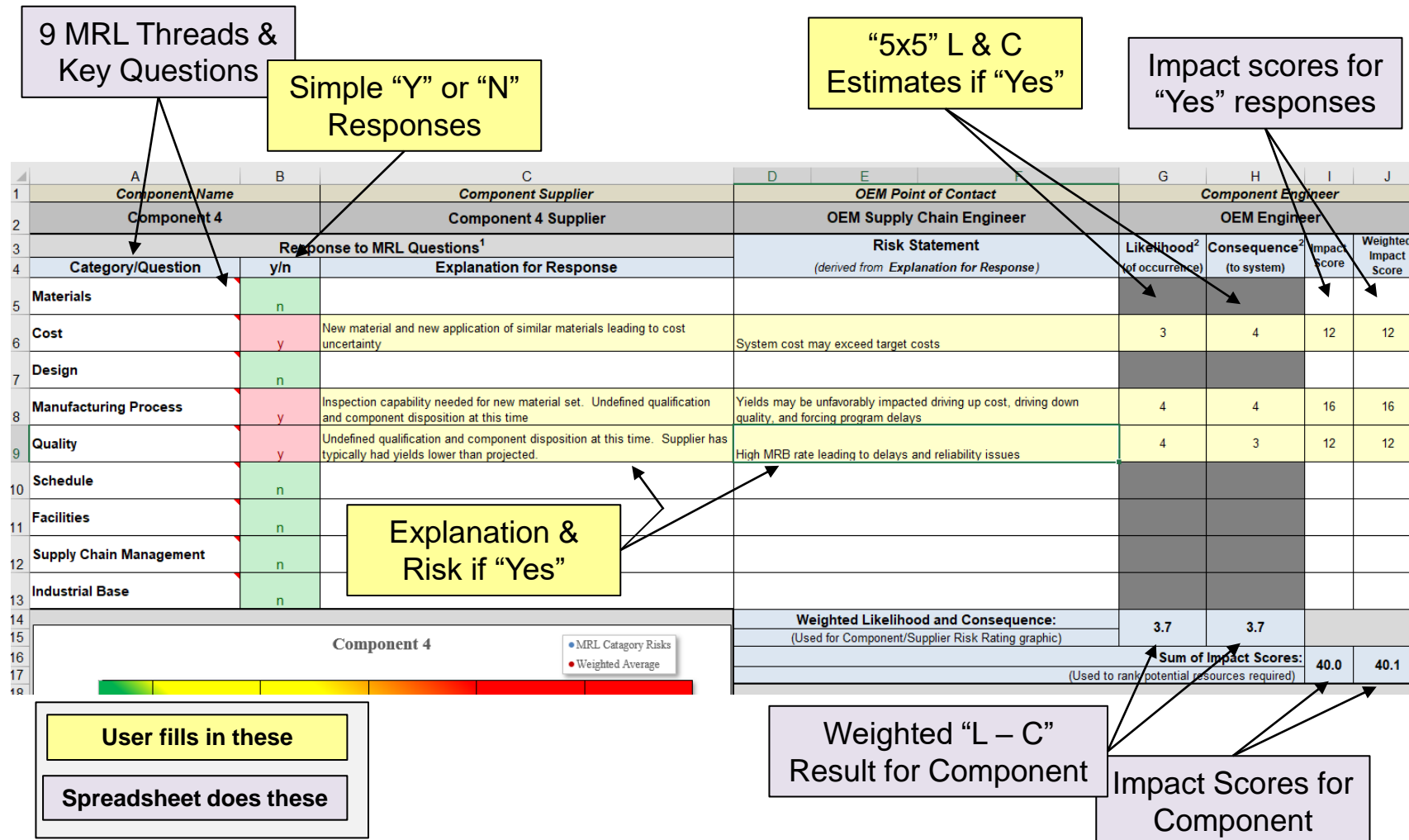
User fills in these fields

Default is equal weighting (recommended)

Default (6m/12m) from DOD risk guide is shown

“Component/Supplier Risk Assessment Tool”

“Component” tab example – showing upper half of page:



“Component/Supplier Risk Assessment Tool”

“Component” tab example – showing lower half of page:

“L – C” results for 9 Questions

“Likelihood” guidance from DOD risk guide

Live links to consolidated results

Weighted “L – C” results for component

Categories shown at 0,0, have “n” Question Response OR no Likelihood/Consequence Values above

Weighted Likelihood and Consequence:		
(Used for Component/Supplier Risk Rating graphic)		
3.7	3.7	
Sum of Impact Scores:		
(Used to rank potential resources required)		
40.0	40.1	

Category Guidance: Likelihood of Occurrence		
Level	Likelihood	Probability of Occurrence
1	Not Likely	~10%
2	Low Likelihood	~30%
3	Likely	~50%
4	Highly Likely	~70%
5	Near Certainty	~90%

Category Guidance: Consequence (System Impact)				
Level	Consequence	System Impact		
		Technical Performance	Schedule	Cost
1	Minimal	Minimal or no consequence to technical performance	Minimal or no impact	Minimal or no impact
2	Minor	Minor reduction in technical performance or supportability, can be tolerated with little or no impact on program	Able to meet key dates. Slip < 6 month(s)	Budget increase or unit production cost increases. (< 1% of Budget)
3	Moderate	Moderate reduction in technical performance or supportability	Minor schedule slip. Able to meet key milestones with no schedule float.	Budget increase or unit production cost increases. (< 5% of Budget)
4	Significant	Major reduction in supportability; may jeopardize program success	Slip < 12 months	Budget increase or unit production cost increases. (< 10% of Budget)
5	Severe	Severe degradation in technical performance; Cannot meet KPP or key technical/supportability threshold; will jeopardize program success	Cannot meet key program milestones. Slip > 12months	Exceeds APP threshold (> 10% of Budget)

Revision history and notes (user input)

Action Taken with this Supplier	Date	Comments for Action Taken
No Action	7/28/2020	Initial Assessment

1 - Reference - DOD MRL Deskbook (pp 32) - http://www.dodmrl.com/MRL_Deskbook_2018.pdf

2 - Reference - Risk Management Guide for DOD Acquisition - Sixth Edition (Version 1.0) https://www.acq.osd.mil/damir/documents/DAES_2006_RISK_GUIDE.pdf

“Component/Supplier Risk Assessment Tool”

“Component Summary Sheet” example. Users and reviewers can see overall results on one page – in table format:

User fills in these fields

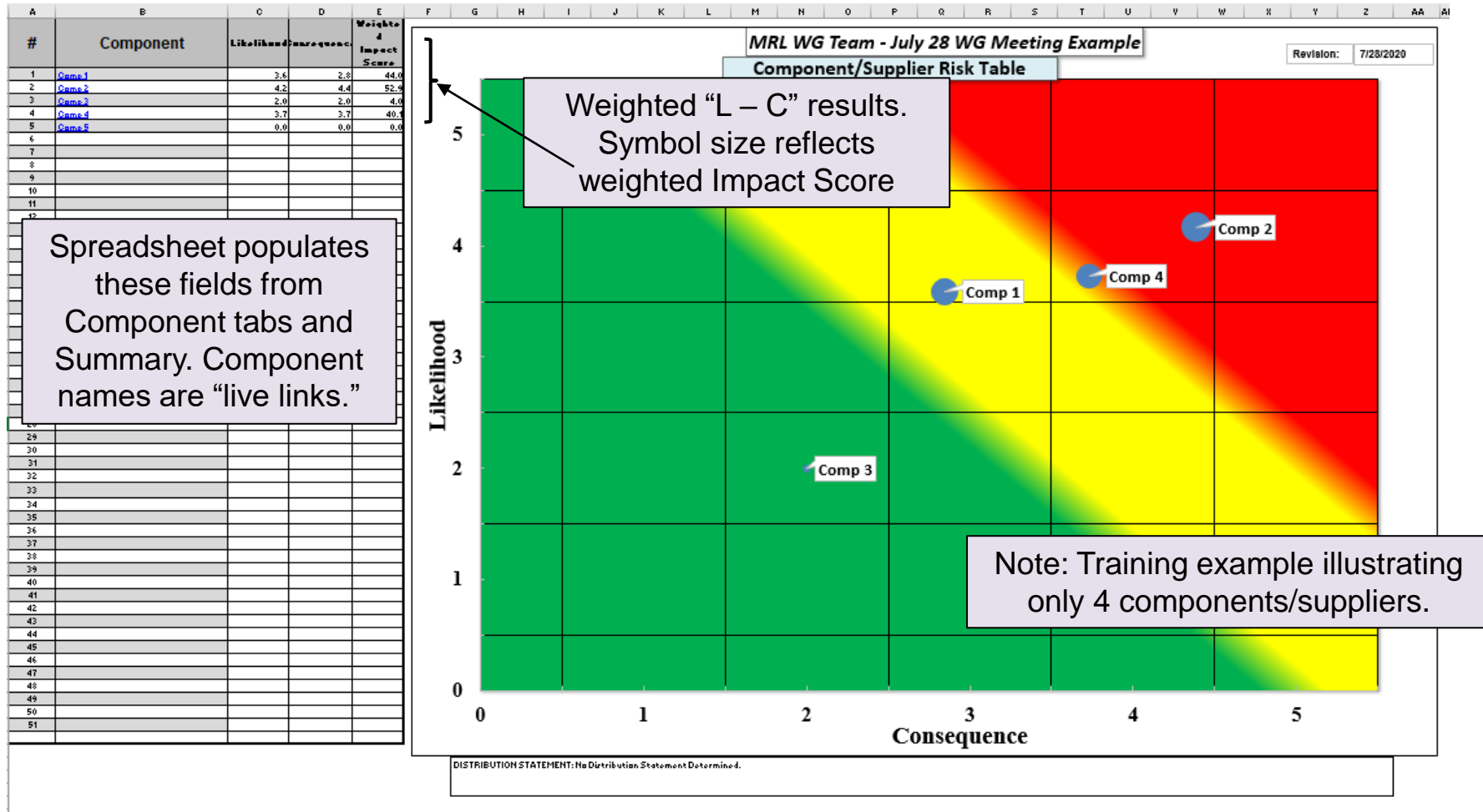
MRL WG Team - July 28 WG Meeting Example - Initial Manufacturing Risk Assessment of Components/Suppliers														Revision: 7/28/2020		Risk Rating
Component Name	Supplier Status (Evaluating or Selected)	Component Technical Lead	Supplier	Materials	Cost	Design	MFG. Process	Quality	Schedule	Facilities	Supply Chain MGMT.	Industrial Base	Likelihood Score (1-5) 5 Highest	Consequence Score (1-5) 5 Highest	Weighted Impact Score (CxL)	Component Description (as needed)
Comp 1	Evaluating	OEM Engineer	Component 1 Supplier	y	y	n	y	n	n	y	n	y	3.6	2.8	44.0	Component 1
Comp 2	Selected	OEM Engineer	Component 2 Supplier	n	n	y	y	n	y	n	n	n	4.2	4.4	52.9	Component 2
Comp 3	Selected	OEM Engineer	Component 3 Supplier	n	n	n	n	n	y	n	n	n	2.0	2.0	4.0	Component 3
Comp 4	Evaluating	OEM Engineer	Component 4 Supplier	n	y	n	y	y	n	n	n	n	3.7	3.7	40.1	Component 4
Comp 5	Evaluating	Engineer	Supplier	n	n	n	n	n	n	n	n	n	0.0	0.0	0.0	

User adds components and tabs as needed. These are also “live links.”

Spreadsheet populates these fields from the Component tabs

“Component/Supplier Risk Assessment Tool”

Consolidated “Risk Rating” example. Users and reviewers can see overall results on one page - in graphical format:



“Component/Supplier Risk Assessment Tool”

Summary...

- *Useful tool for preliminary component and supplier risk evaluation:*
 - *Prioritize future MRA activities.*
- *Successfully used in current form by several large programs:*
 - *Used to identify key risks posed by numerous components, key processes, and suppliers.*
 - *Achieved OEM, program, and MRA Team consensus for next steps.*
- *Latest version regarded mature and suitable for broader use:*
 - *User friendly.*
 - *Revision history, overview, and instructions added.*
- *Excellent format for communication:*
 - *Individual components/suppliers, or key processes.*
 - *Consolidated summary for entire system.*
 - *Progress tracking can be easily documented.*

“Component/Supplier Risk Assessment Tool”

Contact information...

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