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NATIONAL SECURITY RESEARCH DIVISION

# An Excel Tool to Assess Acquisition Program Risk

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Prepared for the Office of the Secretary of Defense

Approved for public release; distribution unlimited

This research was conducted within the Acquisition and Technology Policy Center of the RAND National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community.

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## Preface

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The Department of Defense (DoD) relies on risk management analysis when acquiring large defense acquisition programs. Risk management helps decisionmakers ensure that objectives related to cost, schedule, and performance are met according to program goals. To that end, a team of RAND researchers created a Microsoft Excel–based tool (the Assessor Tool) to help DoD acquisition specialists identify system integration risk areas at any point in the acquisition process. This document offers a users’ manual for the current integration risk application of the Assessor Tool (Version 1.0) and instructions for how to adapt the Assessor Tool for different applications. A complementary report describing the methodology behind the tool and its applications is available as RR-262-OSD, *A Risk Assessment Methodology and Excel Tool for Acquisition Programs* (Fleishman-Mayer, Arena, and McMahon, 2013).

This work should be of interest to those readers interested in risk assessment of major defense programs. The document does not assume an understanding of the DoD acquisition system. This research was conducted within the Acquisition and Technology Policy Center of the RAND National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community.

For more information on the Acquisition and Technology Policy Center, see <http://www.rand.org/nsrd/ndri/centers/atp.html> or contact the director (contact information is provided on the web page).



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## Abbreviations<sup>1</sup>

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|        |                                                                   |
|--------|-------------------------------------------------------------------|
| ADM    | Acquisition Decision Memorandum                                   |
| AoA    | analysis of alternatives                                          |
| ASR    | Alternative Systems Review                                        |
| AT&L   | Acquisition, Technology, and Logistics                            |
| BIT    | Built In Test                                                     |
| CARD   | Cost Analysis Requirements Description                            |
| CDD    | Capability Development Document                                   |
| CDR    | Critical Design Review                                            |
| CM     | Configuration Management                                          |
| CONOP  | concept of operations                                             |
| COTS   | commercial off-the-shelf                                          |
| CPD    | Capability Production Document                                    |
| CSCI   | Computer Software Configuration Item                              |
| DAES   | Defense Acquisition Executive Summary                             |
| DAMIR  | Defense Acquisition Management Information Retrieval              |
| DIACAP | DoD Information Assurance Certification and Accreditation Process |
| DMSMS  | diminishing manufacturing sources and material shortages          |
| DoD    | U.S. Department of Defense                                        |
| DOT&E  | Director, Operational Test and Evaluation                         |
| DT     | Developmental Test                                                |
| ECP    | Engineering Change Protocol                                       |
| EMC    | electromagnetic compatibility                                     |

---

<sup>1</sup> This list includes all of the abbreviations that appear in the Assessor Tool itself, not just those that are in this document.

|         |                                     |
|---------|-------------------------------------|
| EMI     | electromagnetic interference        |
| FoS     | family of systems                   |
| FRP     | Full-Rate Production                |
| GFE     | Government-Furnished Equipment      |
| GOTS    | government off-the-shelf            |
| H, M, L | high, medium, low                   |
| HSI     | human-system interface              |
| ICD     | interface control document          |
| ICWG    | Interface Control Working Group     |
| IMS     | Integrated Master Schedule          |
| IPT     | Integrated Product Team             |
| IRL     | Integration Readiness Level         |
| IRR     | Integration Readiness Review        |
| IRS     | Interface Requirement Specification |
| ITT     | Integrated Test Team                |
| JITC    | Joint Interoperability Test Command |
| KPP     | key performance parameter           |
| MDD     | Material Development Decision       |
| MLDT    | Mean Logistics Delay Time           |
| MOA     | Memorandum of Agreement             |
| MOU     | Memorandum of Understanding         |
| MS      | milestone                           |
| MTBF    | Mean Time Between Failure           |
| MTTR    | Mean Time to Repair                 |
| NDI     | Non-Developmental Item              |
| NR-KPP  | Net-ready Key Performance Parameter |
| N-M     | Nunn-McCurdy                        |
| OIPT    | Overarching Integrated Product Team |
| OSD     | Office of the Secretary of Defense  |
| OT      | Operational Testing                 |

|         |                                                                      |
|---------|----------------------------------------------------------------------|
| OV      | operational view                                                     |
| PCA     | Physical Configuration Audit                                         |
| PDR     | Preliminary Design Review                                            |
| PESHE   | programmatic environment, safety, and occupational health evaluation |
| POPS    | Probability of Program Success                                       |
| PRR     | Production Readiness Review                                          |
| PSP     | Product Support Plan                                                 |
| R&M     | Reliability and Maintainability                                      |
| RMA     | Reliability, Maintainability, and Availability                       |
| SE      | systems engineering                                                  |
| SEP     | Systems Engineering Plan                                             |
| SFR     | System Functional Review                                             |
| SI      | system integration                                                   |
| SIDD    | Software Interface Design Description                                |
| SoS     | system of systems                                                    |
| SFR     | System Functional Review                                             |
| SRL     | system readiness level                                               |
| SRR     | system requirements review                                           |
| SSD     | Spectrum Supportability Determination                                |
| SUBSAFE | Submarine Safety Program                                             |
| SVR     | system verification review                                           |
| SWAP    | size, weight, and power                                              |
| T&E     | test and evaluation                                                  |
| TDS     | Technology Development Strategy                                      |
| TEMP    | test and evaluation master plan                                      |
| TRL     | Technology Readiness Level                                           |
| TRR     | Test Readiness Review                                                |
| UUE     | Unit Under Evaluation                                                |
| WSARA   | Weapon Systems Acquisition Reform Act                                |



## Introduction

---

On May 22, 2009, President Obama signed into law the Weapon Systems Acquisition Reform Act (WSARA) to improve program costs and schedules associated with the delivery of major weapon systems. Some of the oversight changes called for by WSARA depend on a program team's ability to measure and manage the various risks associated with system integration (SI). Because SI may be influenced by all elements of the acquisition process, there exists a wide range of sources for SI risk. At any point, problems with hardware or software, design maturity, timely funding, test plan execution and personnel, facilities, and supplier capabilities can negatively affect program cost, timelines, and performance goals. Historically, integration risks at various phases of the acquisition process have contributed in part to program delays and cost overruns. In response, the U.S. Department of Defense (DoD) has worked toward improving defense program management overall through program and contractor-level risk management practices (DoD, 2006).

Large defense programs can have many technical, legal, and political consequences. Thus, there are many stakeholders across DoD who need to identify the risks associated with DoD's overall weapons programs, as well as the individual technology projects within a program. To date, personnel from the Office of the Secretary of Defense (OSD) who have been more generally involved with weapon systems acquisition—but not necessarily involved with individual programs—have had no access to an OSD-level systematic method of determining a program's ability to meet its goals, or to monitor the success of the defense sector's compliance with WSARA over the acquisition lifecycle. The methods currently available to OSD personnel are too technically focused and are relevant only to personnel who have detailed knowledge at the individual program level.

The Excel information-based risk tool (referred to as the “Assessor Tool,” or “tool” for short, for the remainder of the document) described herein (Version 1.0) is designed to assist the DoD acquisition community in assessing weapon SI risk in accordance with WSARA. A complementary report describing the methodology behind the tool and its applications is available as RR-262-OSD, *A Risk Assessment Methodology and Excel Tool for Acquisition Programs* (Fleishman-Mayer, Arena, and McMahon, 2013). The package offers an OSD-level approach to the evaluation and measurement of SI risk. That is, it is meant for assessors, such as OSD personnel, who may not be especially familiar with the specific program under evaluation but still may need to make judgments about the program's risk. The tool is a custom-designed software package in Excel that allows for easy accessibility of an OSD-level audience. Other systems engineering (SE) risk management software tools, such as a COTS (commercial off-the-shelf) SE tool (e.g., Lebron, Rossi, and Foor, 2000), may not be appropriate or easily avail-

able for this audience. While potentially not unique, the tool is tailored specifically to OSD personnel, allowing for its ease of use.

The Assessor Tool, developed by RAND researchers, is based on a tractable and comprehensive set of questions that can help evaluate integration risk at each point in the acquisition process. More specifically, the tool enables users to see how well integration risk is being managed by providing a standards-based valuation of integration issues that can lead to cost growth, schedule growth, and program performance shortfalls. These standards are based on the existence and completeness of DoD artifacts and checklists that would be readily available to an assessor at the OSD level. As requested by the OSD sponsor, we developed the tool and its methodology to help OSD-level acquisition professionals address these potential risks to major programs; early identification and reconciliation of SI issues as mandated by WSARA can reduce the likelihood and magnitude of the complications that frequently affect major weapons acquisition programs (Conrow, 1995). While we describe the Assessor Tool in terms of its appropriateness for major weapon systems acquisitions analysis, it should be noted that it is also generalizable to an entire set of OSD-level information-based risk assessment applications.

## User Manual for Assessor Tool

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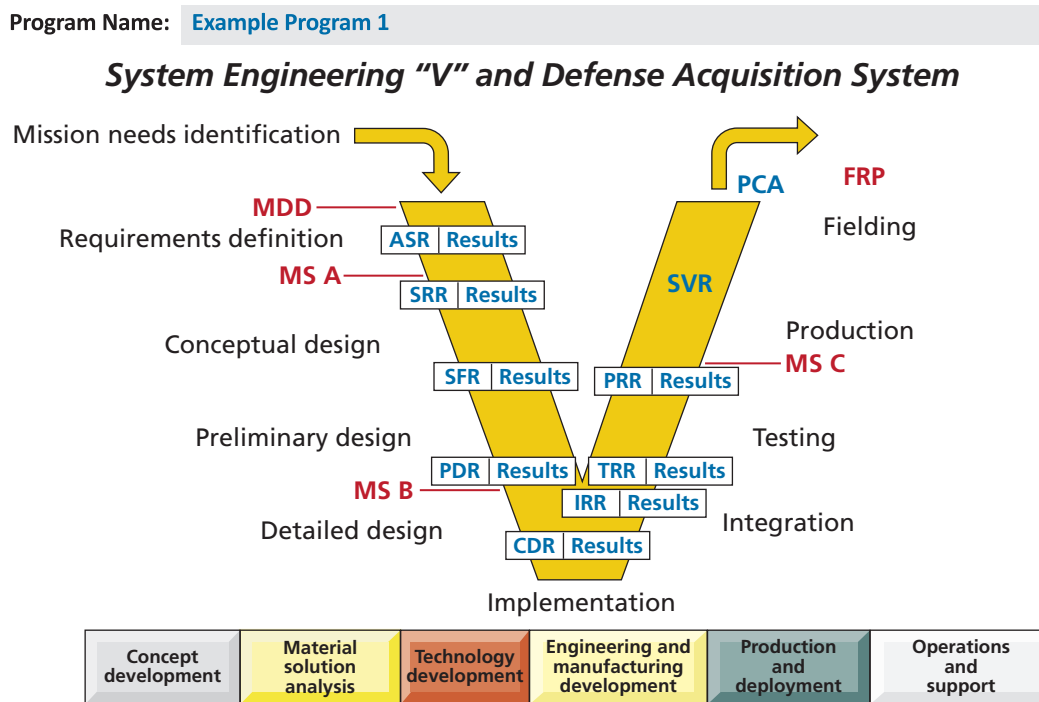
The Assessor Tool (Version 1.0) described in this document can be used in its existing application for assessing a weapon systems acquisition program's integration risk, as well as adapted for other programs and compliance risk assessments. This chapter provides step-by-step instructions to perform both of these functions. It assumes that users have read the main report (Fleishman-Mayer, Arena, and McMahon, 2013) and therefore does not provide detailed definitions of terms such as "secondary questions" or "relevant artifacts."

### Instructions to Use the Existing Application of the Assessor Tool (Weapon Systems Acquisition Integration Risk)

This section contains step-by-step instructions for a user of the existing integration risk Assessor Tool. The instructions will lead the user through an exercise to assess a specific weapon systems acquisition program at a specific program phase (ASR, PDR, etc.). A user can use these instructions to answer the existing phase-specific and global questions as to their completeness and importance and can add questions tailored to the program under assessment.

1. Open the Excel file, enabling macros if possible.
2. The Excel file should open to the overview tab (see Figure 2.1). If not, find this tab at the bottom of the window and click on it.
3. At the top of the page, fill in the program name in the area highlighted in gray.
4. Click the button for the appropriate program phase (see Table 2.1) (ASR, PDR, etc.).
5. At the top of the page, fill in the assessor name and date.
6. For each program phase question (highlighted in blue), read the question. If it is a primary question, choose its level of importance on a scale from 1 (Little Importance) to 5 (Extremely Important). Next, for all primary and secondary questions, choose its appropriate "Assessment": Addressed, Partially Addressed, Not Addressed, or Not Applicable. If a primary question is Not Applicable, its corresponding secondary questions may be skipped.
7. The last five lines allow for the program phase questions to be tailored to a specific program. If there are applicable questions, type them into the blank spaces in the "Question" column. See Fleishman-Mayer, Arena, and McMahon, 2013, for a discussion of designing and properly framing questions for the tool.
  - a. Organize questions such that secondary questions fall directly below the associated primary question.

**Figure 2.1**  
**Overview Tab of the Assessor Tool**



NOTE: All abbreviations can be found in the Abbreviations list.

RAND TL311-2.1

- b. In the column labeled ID, update the numbers to reflect the addition of secondary questions. That is, ID numbers for primary questions are given whole numbers, while secondary questions associated with the primary include the same whole number with an additional decimal, ascending in increments of 0.1 (e.g., a primary question with the ID 9 will have secondary questions with IDs 9.1, 9.2, etc.). *Note that skipping this step will cause there to be an error in the overall relative risk calculation.*
- c. In the relevant artifacts and domain area columns, fill in as appropriate.
- d. Next, choose the level of importance on a scale from 1 (Little Importance) to 5 (Extremely Important) for each of the custom primary questions. Note that the importance of custom secondary questions will be the same as their associated primary as long as all steps included in step 5 have been followed. Thus, there is no reason to assign an importance level to secondary questions.
- e. For all custom primary and secondary questions, choose its appropriate "Assessment": Addressed, Partially Addressed, Not Addressed, or Not Applicable.

**Table 2.1**  
**Sample ASR Assessor Data Entry Phase**

Program Name: Example Program 1

Assessor Name: Joe Smith

Date: 6/13/2012

| ID  | Question                                                                                                                                                                                                                                                                                        | Technical Review | Relevant Artifacts                               | Domain Area                   | Importance                | Assessment          | Score | Weight | Relative Risk | Relative Risk (un-weighted) |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------|-------------------------------|---------------------------|---------------------|-------|--------|---------------|-----------------------------|
| 1   | Does the CONOPs identify the relationships, dependencies and desired interfaces envisioned between new or upgraded systems and other existing or planned systems?                                                                                                                               | ASR              | CONOPs, OV-1, TDS                                | Design and Engineering        | 4 - Very Important        | Partially Addressed | 0.5   | 4      | 0.04          | 0.04                        |
| 1.1 | Does the operational views (OV-1) frame the operation concept ( what happens, who does what, in what order, to accomplish what goal) and highlight interactions to the environment and other external systems?                                                                                  | ASR              | OV-1                                             | Design and Engineering        |                           | Not Addressed       | 1     | 4      | 0.08          | 0.07                        |
| 2   | Does the Initial Capabilities Document explain how the required capabilities are dependent upon interface with other systems? Does it also define interoperability requirements of the capabilities in terms of high-level Operational View (OV-1)?                                             | ASR              | Initial capabilities document, OV-1              | Design and Engineering        | 2 - A Little important    | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |
| 3   | Are the system and/or FoS/SoS reliability, maintainability, availability performance parameters identified?                                                                                                                                                                                     | ASR              | SEP, initial capabilities document, CONOPs, OV-1 | Logistics and Maintainability | 3 - Somewhat important    | Addressed           | 0     | 3      | 0.00          | 0.00                        |
| 3.1 | Has a formal DMSMS program been established?                                                                                                                                                                                                                                                    | ASR              |                                                  | Logistics and Maintainability |                           | Partially Addressed | 0.5   | 3      | 0.03          | 0.04                        |
| 4   | Has a draft Systems Engineering Plan been Developed?                                                                                                                                                                                                                                            | ASR              | SEP                                              | Program Management            | 4 - Very Important        | Partially Addressed | 0.5   | 4      | 0.04          | 0.04                        |
| 4.1 | Has the Electromagnetic Spectrum supportability assessment factors been completed and submitted for spectrum supportability approval?                                                                                                                                                           | ASR              | SSD, SEP                                         | Design and Engineering        |                           | Not Addressed       | 1     | 4      | 0.08          | 0.07                        |
| 4.2 | Does the integrated architecture adhere to the DoD net-centric strategies?                                                                                                                                                                                                                      | ASR              | Net Centric Data Strategy                        | Design and Engineering        |                           | Addressed           | 0     | 4      | 0.00          | 0.00                        |
| 4.3 | Is the system's architecture explicitly documented to the same level as the systems requirements? Does the architecture documentation describe the rationale for partitioning functionality and for placing key architectural attributes within or across a subset of architectural boundaries? | ASR              | SEP                                              | Design and Engineering        |                           | Addressed           | 0     | 4      | 0.00          | 0.00                        |
| 4.4 | Have HSI issues been integrated into the systems acquisition documentation?                                                                                                                                                                                                                     | ASR              | SEP                                              | Design and Engineering        |                           | Not Addressed       | 1     | 4      | 0.08          | 0.07                        |
| 4.5 | Does the program have a SoS engineering IPT?                                                                                                                                                                                                                                                    | ASR              | SEP                                              | Program Management            |                           | Addressed           | 0     | 4      | 0.00          | 0.00                        |
| 5   | Have software testing requirements been identified?                                                                                                                                                                                                                                             | ASR              | SEP, CARD                                        | Test and Evaluation           | 5 - Extremely Important   | Partially Addressed | 0.5   | 5      | 0.05          | 0.04                        |
| 6   | Have the requirements for an integrated test facility been identified?                                                                                                                                                                                                                          | ASR              | SEP, CARD                                        | Test and Evaluation           | 4 - Very Important        | Addressed           | 0     | 4      | 0.00          | 0.00                        |
| 7   | Did the AoA performance assessment adequately evaluate integration issues/FoS/SoS?                                                                                                                                                                                                              | ASR              | AoA                                              | Design and Engineering        | 3 - Somewhat important    | Partially Addressed | 0.5   | 3      | 0.03          | 0.04                        |
| 8   | Have the requirements for integration test activities been identified and included in the cost estimate?                                                                                                                                                                                        | ASR              | SEP, CARD                                        | Test and Evaluation           | 3 - Somewhat important    | Not Addressed       | 1     | 3      | 0.06          | 0.07                        |
| 9   |                                                                                                                                                                                                                                                                                                 | ASR              |                                                  |                               | 1 - Very Little Important | Addressed           | 0     | 0      | 0.00          | 0.00                        |
| 10  |                                                                                                                                                                                                                                                                                                 | ASR              |                                                  |                               | 1 - Very Little Important | Addressed           | 0     | 0      | 0.00          | 0.00                        |
| 11  |                                                                                                                                                                                                                                                                                                 | ASR              |                                                  |                               | 1 - Very Little Important | Addressed           | 0     | 0      | 0.00          | 0.00                        |
| 12  |                                                                                                                                                                                                                                                                                                 | ASR              |                                                  |                               | 1 - Very Little Important | Addressed           | 0     | 0      | 0.00          | 0.00                        |
| 13  |                                                                                                                                                                                                                                                                                                 | ASR              |                                                  |                               | 1 - Very Little Important | Addressed           | 0     | 0      | 0.00          | 0.00                        |
|     |                                                                                                                                                                                                                                                                                                 |                  |                                                  |                               | Total ASR Relative Risk   |                     |       |        | 0.46          | 0.46                        |

NOTE: All abbreviations can be found in the Abbreviations list.

8. Scroll down on the page to find the global questions (highlighted in purple). See Table 2.2. For each global question, follow the same instructions in steps 6 and 7 above. Note that “Assessment” choices may be somewhat different than those for the program phase questions (e.g., Yes, Somewhat, No, Not Applicable; High, Medium, Low, Not Applicable).
9. Scroll to the very bottom of the program phase tab to reveal a button labeled “Results.” Click the “Results” button or choose the results tab in Excel associated with the appropriate program phase.
10. Review the results report (e.g., Figure 2.2). See Fleishman-Mayer, Arena, and McMahon, 2013, for a further discussion of the results report. The buttons at the top of the page allow for the report to be printed and will direct the user back to the home page or back to the program phase questions.

### **Adapting the Assessor Tool for Other Programs or Information-Based Risk Assessments<sup>1</sup>**

This section contains step-by-step instructions for a user of the Assessor Tool template. The instructions will lead the user through an exercise to create a tailored Assessor Tool, such as the example integration risk Assessor Tool described in Fleishman-Mayer, Arena, and McMahon, 2013. A user can use these instructions to create Excel tabs to hold questions about, and results for, multiple program phases. For instructions of how to assess the program associated with this adapted tool, a user may loosely follow the instructions presented previously for the integration risk application of the Assessor Tool.

1. Open the Assessor Tool template file (see Table 2.3).
2. If the program of interest has more than one program phase, make copies of the existing questions and results tab.
  - a. Rename the tabs to reflect program phases. For example, for the ASR program phase, the questions tab could be named “ASR,” and the results tab could be named “ASR Results.”
  - b. Go to each results tab and change all formula references to the corresponding questions sheet.
    - One way to do this:
      - Show all formulas in the tab using the “show formulas” option/command in Excel.<sup>2</sup>
      - Using “Find and Replace All,” change the tab reference “Questions Template” to the name of the appropriate questions tab (e.g., ASR).
      - Hide all formulas.

<sup>1</sup> Note that these instructions assume moderate-level Excel skills.

<sup>2</sup> To show formulas in Excel 2012, go to the File menu and select Options. It will bring up the Excel Options dialog. From the left sidebar, click Advanced, and from the right pane scroll down to find Display options for this worksheet group. Under this group, enable the “Show formulas in cells instead of their calculated result” option. Click OK to continue. To show formulas in Excel 2007 for the Mac, go to the Excel ribbon titled Formulas, and under the Function heading, select the Show label.

Table 2.2  
Sample ASR Assessor Data Entry Phase, Global Questions

Program Name: Example Program 1

Assessor Name: Joe Smith

Date: 6/13/2012

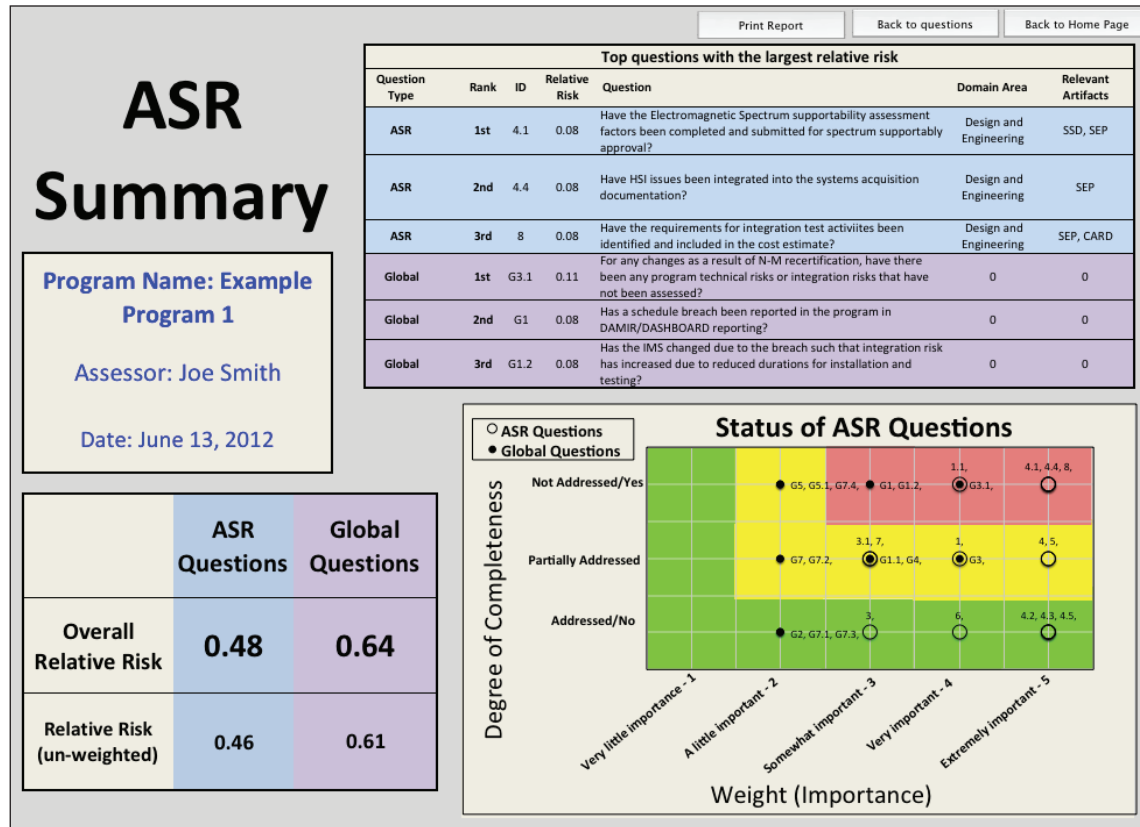
| ID                         | Question                                                                                                                                          | Technical Review | Relevant Artifacts | Domain Area | Importance                | Assessment     | Score | Weight | Relative Risk | Relative Risk (un-weighted) |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------|-------------|---------------------------|----------------|-------|--------|---------------|-----------------------------|
| G1                         | Has a schedule breach been reported in the program in DAMIR/DASHBOARD reporting?                                                                  | ASR              |                    |             | 3 - Somewhat important    | Yes            | 1     | 3      | 0.08          | 0.07                        |
| G1.1                       | Was the schedule breach due to major system development, deliveries or production that increase integration risk?                                 | ASR              |                    |             |                           | Somewhat       | 0.5   | 3      | 0.04          | 0.04                        |
| G1.2                       | Has the IMS changed due to the breach such that integration risk has increased due to reduced durations for installation and testing?             | ASR              |                    |             |                           | Yes            | 1     | 3      | 0.08          | 0.07                        |
| G2                         | Have funding changes increased integration risk due to inadequate funds for testing or resulted in delays for technology insertion?               | ASR              |                    |             | 2 - A little important    | No             | 0     | 2      | 0.00          | 0.00                        |
| G3                         | Has the program been identified for a Nunn-McCurdy breach?                                                                                        | ASR              |                    |             | 4 - Very Important        | No             | 0.5   | 4      | 0.06          | 0.04                        |
| G3.1                       | For any changes as a result of N-M recertification, have there been any program technical risks or integration risks that have not been assessed? | ASR              |                    |             |                           | Yes            | 1     | 4      | 0.11          | 0.07                        |
| G4                         | Are there any technology risk issues identified in the most recent ADM that have not been addressed by the program?                               | ASR              |                    |             | 3 - Somewhat important    | Somewhat       | 0.5   | 3      | 0.04          | 0.04                        |
| G5                         | What is the DOT&E risk assessment for the program (H, M, L)?                                                                                      | ASR              |                    |             | 2 - A little important    | High           | 1     | 2      | 0.06          | 0.07                        |
| G5.1                       | Has any of the TEMP not been concurred and funded?                                                                                                | ASR              |                    |             |                           | Yes            | 1     | 2      | 0.06          | 0.07                        |
| G6                         | Has a major sub-system or technology vendor failure occurred or vendor been disqualified or changed?                                              | ASR              |                    |             | 1 - Very Little Important | Not Applicable | 0     | 0      | 0.00          | 0.00                        |
| G6.1                       | What is the associated integration risk effect on the program (H,M,L)?                                                                            | ASR              |                    |             |                           | Medium         | 0     | 0      | 0.00          | 0.00                        |
| G7                         | Have all required certifications or the planning to achieve required certifications at the appropriate time been addressed?                       | ASR              |                    |             | 2 - A little important    | Some           | 0.5   | 2      | 0.03          | 0.04                        |
| G7.1                       | Information Assurance (e.g. DIACAP and NSA Cryptographic Certification) ?                                                                         | ASR              |                    |             |                           | All            | 0     | 2      | 0.00          | 0.00                        |
| G7.2                       | Interoperability (e.g. Net Ready KPP, Joint Interoperability Test Certificate)?                                                                   | ASR              |                    |             |                           | Some           | 0.5   | 2      | 0.03          | 0.04                        |
| G7.3                       | Spectrum Management ( e.g. EMI / EMC Cert., Spectrum Cert.)?                                                                                      | ASR              |                    |             |                           | All            | 0     | 2      | 0.00          | 0.00                        |
| G7.4                       | Safety (e.g. Airworthiness, SUBSAFE, PESHE)?                                                                                                      | ASR              |                    |             |                           | None           | 1     | 2      | 0.06          | 0.07                        |
| G8                         |                                                                                                                                                   | ASR              |                    |             | 1 - Very Little Important | Yes            | 1     | 0      | 0.00          | 0.00                        |
| G9                         |                                                                                                                                                   | ASR              |                    |             | 1 - Very Little Important | Yes            | 1     | 0      | 0.00          | 0.00                        |
| G10                        |                                                                                                                                                   | ASR              |                    |             | 1 - Very Little Important | Yes            | 1     | 0      | 0.00          | 0.00                        |
| G11                        |                                                                                                                                                   | ASR              |                    |             | 1 - Very Little Important | Yes            | 1     | 0      | 0.00          | 0.00                        |
| Total Global Relative Risk |                                                                                                                                                   |                  |                    |             |                           |                |       |        | 0.64          | 0.61                        |

Results

Back to Home Page

NOTE: All abbreviations can be found in the Abbreviations list.

**Figure 2.2**  
Results Page for Sample Run



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- c. Change data references and labels in the graph.
  - To find data references: Right click with the pointer over the graph, choose “select data.”
  - To change the labels, it may be necessary to download an Excel add-in.<sup>3</sup>
3. For each questions tab:
  - a. After organizing questions such that secondary questions fall directly below the associated primary question, type phase-specific questions in the appropriate cells (into the blank spaces in the “Question” column). See Fleishman-Mayer, Arena, and McMahon, 2013, for a discussion of designing and properly framing questions for the tool.
  - b. In the column labeled ID, update the numbers to reflect the addition of secondary questions. That is, ID numbers for primary questions are given whole numbers, while secondary questions associated with the primary include the same whole

<sup>3</sup> In Microsoft Excel, there is no built-in command that automatically attaches text labels to data points in an xy (scatter) chart. However, you can create a Microsoft Visual Basic for Applications macro that does this. There is an xy labeler add-in that does not require writing your own macro. See Application Professionals, not dated.

Table 2.3  
Assessor Tool Template File

|               |                 |                |         |                |           |       |         |
|---------------|-----------------|----------------|---------|----------------|-----------|-------|---------|
| Program Name: | Example Program | Program Stage: | Stage 1 | Assessor Name: | Joe Smith | Date: | 6/13/12 |
|---------------|-----------------|----------------|---------|----------------|-----------|-------|---------|

| ID                       | Question                  | Relevant Artifacts | Domain Area | Importance                 | Assessment          | Score | Weight | Relative Risk | Relative Risk (un-weighted) |
|--------------------------|---------------------------|--------------------|-------------|----------------------------|---------------------|-------|--------|---------------|-----------------------------|
| STAGE-SPECIFIC QUESTIONS |                           |                    |             |                            |                     |       |        |               |                             |
| 1                        | Replace with question 1   |                    |             | 1 - Very Little Importance | Partially Addressed | 0.5   | 1      | 0.08          | 0.13                        |
| 1.1                      | Replace with question 1.1 |                    |             | 2 - A little important     | Partially Addressed | 0.5   | 1      | 0.08          | 0.13                        |
| 2                        | Replace with question 2   |                    |             | 3 - Somewhat important     | Not Addressed       | 1     | 3      | 0.50          | 0.25                        |
| 3                        | Replace with question 3   |                    |             | 1 - Very Little Importance | Addressed           | 0     | 1      | 0.00          | 0.00                        |
| 5                        |                           |                    |             | 1 - Very Little Importance | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |
| 6                        |                           |                    |             | 1 - Very Little Importance | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |
| 7                        |                           |                    |             | 3 - Somewhat important     | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |
| 8                        |                           |                    |             | 1 - Very Little Importance | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |
| 9                        |                           |                    |             | 1 - Very Little Importance | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |
| 10                       |                           |                    |             | 1 - Very Little Importance | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |
| 11                       |                           |                    |             | 2 - A little important     | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |
| 12                       |                           |                    |             | 2 - A little important     | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |
| 13                       |                           |                    |             | 1 - Very Little Importance | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |
| 14                       |                           |                    |             | 1 - Very Little Importance | Not Applicable      | 0     | 0      | 0.00          | 0.00                        |

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number with an additional decimal, ascending in increments of 0.1 (e.g., a primary question with the ID 9 will have secondary questions with IDs 9.1, 9.2, etc.). *Note that skipping this step will cause there to be an error in the overall relative risk calculation.*

- c. In the relevant artifacts and domain area columns, fill in as appropriate.
- d. Note that the template allows for the inclusion of 50 phase-specific questions and 30 global questions per program phase.

## Conclusion

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This document presented the User Manual for the Assessor Tool, which can be used to facilitate an OSD-level information-based risk assessment for acquisition or other major programs. A complementary report describing the methodology behind the tool and its applications is available as RR-262-OSD, *A Risk Assessment Methodology and Excel Tool for Acquisition Programs* (Fleishman-Mayer, Arena, and McMahon, 2013). The tool includes a generalizable form of the Assessor Tool as well as the integration risk Assessor Tool provided as an example application. The reproducible and documented tool for integration risk assessment may be considered for program office reporting to meet WSARA compliance as well as for other acquisition reviews, such as the OSD Defense Acquisition Executive Summary and Overarching Integrated Product Team reviews, and for adaptation into other program assessment tools, such as the Probability of Program Success tool. As of this writing, the Assessor Tool has not yet been validated in a real-world setting. Potential future work could include its validation.



## References

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Application Professionals, *XY Chart Labeler*, Version 7.1, not dated. As of March 25, 2013:

<http://www.appspro.com/Utilities/ChartLabeler.htm>

Conrow, Edmund H., “Some Long-Term Issues and Impediments Affecting Military Systems Acquisition Reform,” *Acquisition Review Quarterly*, Vol. 2, No. 3, Summer 1995, pp. 199–212.

Department of Defense (DoD), *Risk Management Guide for DOD Acquisition*, Sixth Ed., Version 1.0, August 2006. As of September 12, 2012:

<http://www.acq.osd.mil/se/docs/2006-RM-Guide-4Aug06-final-version.pdf>

Fleishman-Mayer, Lauren A., Mark V. Arena, and Michael E. McMahon, *A Risk Assessment Methodology and Excel Tool for Acquisition Programs*, Santa Monica, Calif.: RAND Corporation, RR-262-OSD, 2013. As of July 1, 2013:

[http://www.rand.org/pubs/research\\_reports/RR262.html](http://www.rand.org/pubs/research_reports/RR262.html)

Lebron, Ruben A., Jr., Robert Rossi, and William Foor, “Risk-Based COTS Systems Engineering Assessment Model: A Systems Engineering Management Tool and Assessment Methodology to Cope with the Risk of Commercial Off-the-Shelf (COTS) Technology Insertion During the System Life Cycle,” in *Strategies to Mitigate Obsolescence in Defense Systems Using Commercial Components*, Defense Technical Information Center, October 2000. As of September 12, 2012:

<http://handle.dtic.mil/100.2/ADP010964>

Weapon Systems Acquisition Reform Act of 2009, S. 454, 111th Congress, February 23, 2009. As of September 12, 2012:

<http://www.govtrack.us/congress/bills/111/s454>