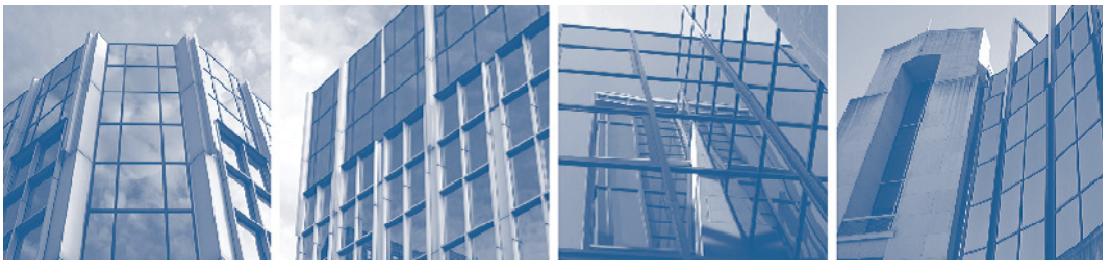


Rethinking Risk Management: *Workbook*

NDIA Systems Engineering Conference 2009

Mission Success in Complex Environments

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Exercise 1: *Program Failure*

Directions

Please read the following scenario and answer the accompanying two questions.

Scenario

Program Overview

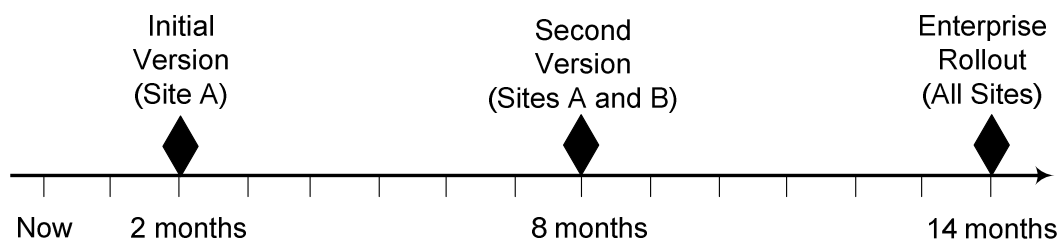
Company Z has 4,000 employees at 11 sites. For many years, each site has had its own information technology (IT) infrastructure and applications, with limited sharing of data and functions between sites. A new initiative sponsored by the CIO is rolling out a common IT infrastructure for all sites. In addition, several enterprise applications are being upgraded to take advantage of the capabilities provided by the new IT infrastructure. A new payroll application, called EveryPay, is scheduled to be the first new application deployed across the enterprise.

Key Program Aspects

The following describes key aspects of the EveryPay application program:

- **Complex interfaces**
EveryPay relies heavily on the new infrastructure for messaging and other basic functions. EveryPay also requires accurate, up-to-date data from 18 other existing applications, most of which exist in one form or another at each site. None of these other applications are centrally managed nor have the same degree of configuration control as EveryPay.
- **Deployment plan for EveryPay**
The initial version of EveryPay will be deployed at Site A in two months. Six months later, the second version of EveryPay will be deployed at Sites A and B. The enterprise-wide rollout of the production version of EveryPay will begin six months after that. IT staff and business analysts at Site A have been working closely with the developers to ensure the application meets their site needs and there are no delays in issuing paychecks.

Deployment Timeline for EveryPay



- **High profile**

The CIO promised the governing board of Company Z that EveryPay will reduce costs by 25% and will be deployed on schedule. She recently invited key board members to attend an official demonstration at Site A to be held three weeks after the initial version of EveryPay is deployed.

A month after the CIO made her promise to the board, the program team encountered several problems that put program several months behind schedule. Fearing repercussions if her promise were not kept, the CIO made it clear to the program manager that he must have something to demonstrate to the board members when they visit Site A. To ensure the schedule will be met, the CIO and program manager agreed to reduce the scope of the initial version of EveryPay and defer several key functions to the second version.

- **Funding**

EveryPay's program manager has received all of the funding he needs to develop the application. He also has been quietly negotiating with other programs and funding upgrades to some of their applications that must interface with EveryPay at Sites A and B. These support applications need to be updated to ensure that they integrate properly with EveryPay. However, the program manager does not have sufficient authority to make sure that all support applications are updated as required. Unfortunately, no one with sufficient management authority understands the importance of this integration issue, and no corporate funds have been provided to ensure that the integration occurs.

- **Training**

The training department has worked with Site A to develop training for the revised payroll work processes. This training is targeted at payroll administrators. The training department will also create an on-line training module for all Company Z personnel, which will enable them to access their payroll information using an internal website. Just-in-time training will be provided to payroll administrators at each site when EveryPay is deployed.

- **Developer**

The developer of EveryPay, SWDesigns, Inc., has enjoyed the challenge of developing production grade software for the first time and expects to deliver the application to Site A on schedule. SWDesigns specializes in business process reengineering and requirements development for software-intensive systems. They have in-house developers who create custom applications for SWDesigns' internal use and, on occasion, have developed prototype applications for customers.

Originally, SWDesigns was only contracted by Company Z to develop requirements for EveryPay. However, because a contract was already in place and staff from SWDesigns had developed good working relationships with staff from Company Z, the management at Company Z extended SWDesigns' contract to also include systems development and deployment.

Result

Management had agreed to reduce the scope of the initial version and defer several key functions to the second version in order to meet the CIO's promised schedule for deployment. However, additional problems surfaced when SWDesigns was unexpectedly late in delivering a working copy of the application for integration testing.

To offset this additional delay, the CIO and program manager decided to compress the testing schedule. A typical application at Company Z has historically required 8-10 builds during integration testing. This program, which is considerably more complex than average, only had time to test 2 builds of the application. In addition, several support applications were being upgraded, and the versions of those applications used in integration testing would be different than those deployed in production.

The program team was unable to deploy the initial version on schedule at site A. EveryPay could not properly access the work schedules of half of the departments because of integration problems with several support applications. In addition, payroll administrators could not figure out how to coordinate existing work processes with the new EveryPay work process. To make matters worse, the new infrastructure would not let them keep old applications open at the same time as the new EveryPay application. As a result, administrators would have to keep opening and closing applications. The manager of the payroll administrators estimated that EveryPay would decrease efficiency as much as 50%.

Questions

The CIO blamed the failure on technical problems and on the performance of SWDesigns. She argued that no one could have foreseen these problems. The board is concerned about another high-profile program failure on its watch. It has hired you, an outside consultant, to investigate. The board has asked you to answer the following two questions:

1. What led to the program's failure?
2. Who should have been responsible for resolving these issues and preventing this failure?

Use the next page to write your answers.

Answers

Standard Drivers for Software/System Development and Deployment

Questions for Programmatic Drivers

Driver Question	Category
1. Are program objectives (product, cost, schedule) realistic and achievable? Consider: Alignment of technical, cost, and schedule objectives; inherent technical risk; technology maturity; resources available	Objectives
2. Is the plan for developing and deploying the system sufficient? Consider: Acquisition or development strategy; program plan; resources; funding; schedule; roles and responsibilities	Preparation
3. Is the process being used to develop and deploy the system sufficient? Consider: Process design; measurements and controls; process efficiency and effectiveness; acquisition and development life cycles; training	Preparation
4. Are tasks and activities performed effectively and efficiently? Consider: Experience and expertise of management and staff; staffing levels; experience with the acquisition and development life cycles	Execution
5. Are activities within each team and across teams coordinated appropriately? Consider: Communication; information sharing; dependencies; relationships; partners and collaborators	Execution
6. Will work products from suppliers, partners, or collaborators meet the program's quality and timeliness requirements? Consider: Applications; software; systems or sub-systems; hardware	Execution
7. Is the program's information managed appropriately? Consider: Usability; confidentiality; integrity; availability	Execution
8. Does the program team have the tools and technologies it needs to develop the system and transition it to operations? Consider: Software applications; infrastructure; systems; databases	Execution
9. Are facilities and equipment sufficient to support the program? Consider: Building; physical work spaces; support equipment; supplies; other resources	Execution
10. Are enterprise, organizational, and political conditions facilitating completion of program activities? Consider: Stakeholder sponsorship; actions of upper management; effect of laws, regulations, and policies	Environment
11. Does the program comply with all relevant policies, laws, and regulations? Consider: policies; laws; regulations; standards of care	Environment
12. Does the program have sufficient capacity and capability to identify and manage potential events and changing circumstances? Consider: Risk management plan, process, and tools; schedule slack; funding reserve; risk mitigation plans; program continuity and contingency plans; opportunity management plan, process, and tools	Resilience

Questions for Product Drivers

Driver Question	Category
13. Are system requirements well understood? Consider: Customer, user, and stakeholder requirements and needs; functional and non-functional requirements; operational requirements; system growth and expansion needs; technology maturity	Result
14. Are the design and architecture sufficient to meet system requirements and provide the desired operational capability? Consider: Interfaces; dependencies; software and system architecture; operational requirements; technology maturity	Result
15. Will the system satisfactorily meet its requirements? Consider: Functional; performance; operational; reliability; security; safety; usability; maintainability; technology maturity	Result
16. Will the system be sufficiently integrated and interoperable with other systems when deployed? Consider: Interfaces; applications; tools; hardware; data; technology maturity	Result
17. Will the system effectively support operations? Consider: Business and operational workflows; support of organizational and enterprise missions; operational risk mitigation; disaster recovery, contingency and business continuity plans; technology maturity	Result
18. Have barriers to customer/user adoption of the system been managed appropriately? Consider: User acceptance; stakeholder sponsorship; transition to operations; user support	Result
19. Will people be prepared to operate, use, and maintain the system? Consider: policies; procedures; training	Result
20. Will the system be appropriately certified and accredited for operational use? Consider: compliance with policies, laws, and regulations; acceptable mitigation of risk	Result

Exercise 2: *Failure Drivers*

Directions

Consider the following question in relation to the EveryPay program: *Which failure drivers contributed to the problems experienced by the program?*

Based on the background materials for the previous exercises, check (✓) each failure driver that contributed to the problems experienced by the EveryPay program.

Failure Drivers	
<input type="checkbox"/>	1. Program objectives (technical, cost, schedule) were unrealistic or unachievable. Consider: alignment of technical, cost, and schedule objectives; inherent technical risk; resources available
<input type="checkbox"/>	2. The plan for developing (and deploying) the system was insufficient. Consider: acquisition or development strategy; program plan; resources; funding; schedule; roles and responsibilities
<input type="checkbox"/>	3. The process being used to develop (and deploy) the system was insufficient. Consider: process design; measurements and controls; process efficiency and effectiveness; acquisition and development life cycles; training
<input type="checkbox"/>	4. Tasks and activities were not performed effectively and efficiently. Consider: experience and expertise of management and staff; staffing levels; experience with the acquisition and development life cycles
<input type="checkbox"/>	5. Activities within each team and across teams were not coordinated appropriately. Consider: communication; information sharing; dependencies; relationships; partners and collaborators
<input type="checkbox"/>	6. Work products from suppliers, partners, or collaborators did not meet the program's quality and timeliness requirements. Consider: applications; software; systems or sub-systems; hardware
<input type="checkbox"/>	7. The program's information was not managed appropriately. Consider: usability; confidentiality; integrity; availability
<input type="checkbox"/>	8. The program team did not have the tools and technologies it needed to develop the system and transition it to operations. Consider: software applications; infrastructure; systems; databases
<input type="checkbox"/>	9. Facilities and equipment were not sufficient to support the program. Consider: building; physical work spaces; support equipment; supplies; other resources
<input type="checkbox"/>	10. Enterprise, organizational, and political conditions were not facilitating completion of program activities. Consider: stakeholder sponsorship; actions of upper management; effect of laws, regulations, and policies

Failure Drivers (con't)	
<input type="checkbox"/>	<p>11. The program did not comply with all relevant policies, laws, and regulations. Consider: policies; laws; regulations; standards of care</p>
<input type="checkbox"/>	<p>12. The program did not have sufficient capacity and capability to identify and manage potential events and changing circumstances. Consider: risk management plan, process, and tools; schedule slack; funding reserve; risk mitigation plans; program continuity and contingency plans; opportunity management plan, process, and tools</p>
<input type="checkbox"/>	<p>13. System requirements were not understood. Consider: customer, user, and stakeholder requirements and needs; functional and non-functional requirements; operational requirements; system growth and expansion needs, technology maturity</p>
<input type="checkbox"/>	<p>14. The design and architecture were not sufficient to meet system requirements and provide the desired operational capability. Consider: interfaces; dependencies; software and system architecture; operational requirements, technology maturity</p>
<input type="checkbox"/>	<p>15. The system satisfactorily did not meet its requirements. Consider: functional; performance; operational; reliability; security; safety; usability; maintainability, technology maturity</p>
<input type="checkbox"/>	<p>16. The system was not sufficiently integrated and interoperable with other systems. Consider: interfaces, applications, tools, hardware, data, technology maturity</p>
<input type="checkbox"/>	<p>17. The system did not effectively support operations. Consider: business and operational workflows; support of organizational and enterprise missions; operational risk mitigation; disaster recovery, contingency and business continuity plans, technology maturity</p>
<input type="checkbox"/>	<p>18. Barriers to customer/user adoption of the system had not been managed appropriately. Consider: user acceptance; stakeholder sponsorship; transition to operations; user support</p>
<input type="checkbox"/>	<p>19. People were not prepared to operate, use, and maintain the system. Consider: policies; procedures; training</p>
<input type="checkbox"/>	<p>20. The system was not appropriately certified and accredited for operational use. Consider: compliance with policies, laws, and regulations; acceptable mitigation of risk</p>

Exercise 3A: *Evaluating Your Program*

Directions

You will be using the set of drivers for software programs to evaluate your own programs. Answer the driver questions using the driver criteria provided below. Make sure to document the rationale for each answer in the space provided. If you are uncertain about a particular driver, make your best guess or check the box for “Equally Likely.” If a driver is not applicable to your program, check the “Not Applicable” box.

Driver Value Criteria

Answer	Definition
Yes	The answer is almost certainly “yes.” Almost no uncertainty exists. There is little or no probability that the answer could be “no.” ~ > 95% probability of yes
Likely yes	The answer is most likely “yes.” There is some chance that the answer could be “no.” ~ 75% probability of yes
Equally likely	The answer is just as likely to be “yes” or “no.” ~ 50% probability of yes
Likely no	The answer is most likely “no.” There is some chance that the answer could be “yes.” ~ 25% probability of yes
No	The answer is almost certainly “no.” Almost no uncertainty exists. There is little or no probability that the answer could be “yes.” ~ < 5% probability of yes
Not applicable	The question is not applicable to your program.

Example

Driver Question	Answer						Rationale
	No	Likely no	Equally likely	Likely yes	Yes	Not Applicable	
<p>1. Are program objectives (technical, cost, schedule) realistic and achievable?</p> <p>Consider: alignment of technical, cost, and schedule objectives; inherent technical risk; resources available</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>+ The program team has a good sense of its requirements and responsibilities.</p> <ul style="list-style-type: none"> - Technical objectives do not sufficiently consider integration and functionality issues. - The current set of objectives for the initial deployment phase is not documented or well-communicated to program team. - Plans for the initial deployment phase are driven by the schedule and not by the need to deliver an effective operational capability.

Exercise 3

Driver Questions	Answer						Rationale
	No	Likely no	Equally likely	Likely yes	Yes	Not Applicable	
1. Are program objectives (product, cost, schedule) realistic and achievable? Consider: Alignment of technical, cost, and schedule objectives; inherent technical risk; technology maturity; resources available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Is the plan for developing and deploying the system sufficient? Consider: Acquisition or development strategy; program plan; resources; funding; schedule; roles and responsibilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Is the process being used to develop and deploy the system sufficient? Consider: Process design; measurements and controls; process efficiency and effectiveness; acquisition and development life cycles; training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Are tasks and activities performed effectively and efficiently? Consider: Experience and expertise of management and staff; staffing levels; experience with the acquisition and development life cycles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Are activities within each team and across teams coordinated appropriately? Consider: Communication; information sharing; dependencies; relationships; partners and collaborators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Exercise 3

Driver Questions	Answer						Rationale
	No	Likely no	Equally likely	Likely yes	Yes	Not Applicable	
6. Will work products from suppliers, partners, or collaborators meet the program's quality and timeliness requirements? Consider: Applications; software; systems or sub-systems; hardware	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Is the program's information managed appropriately? Consider: Usability; confidentiality; integrity; availability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Does the program team have the tools and technologies it needs to develop the system and transition it to operations? Consider: Software applications; infrastructure; systems; databases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Are facilities and equipment sufficient to support the program? Consider: Building; physical work spaces; support equipment; supplies; other resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Are enterprise, organizational, and political conditions facilitating completion of program activities? Consider: Stakeholder sponsorship; actions of upper management; effect of laws, regulations, and policies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Exercise 3

Driver Questions	Answer						Rationale
	No	Likely no	Equally likely	Likely yes	Yes	Not Applicable	
11. Does the program comply with all relevant policies, laws, and regulations? Consider: policies; laws; regulations; standards of care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12. Does the program have sufficient capacity and capability to identify and manage potential events and changing circumstances? Consider: Risk management plan, process, and tools; schedule slack; funding reserve; risk mitigation plans; program continuity and contingency plans; opportunity management plan, process, and tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13. Are system requirements well understood? Consider: Customer, user, and stakeholder requirements and needs; functional and non-functional requirements; operational requirements; system growth and expansion needs; technology maturity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14. Are the design and architecture sufficient to meet system requirements and provide the desired operational capability? Consider: Interfaces; dependencies; software and system architecture; operational requirements; technology maturity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15. Will the system satisfactorily meet its requirements? Consider: Functional; performance; operational; reliability; security; safety; usability; maintainability; technology maturity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Exercise 3

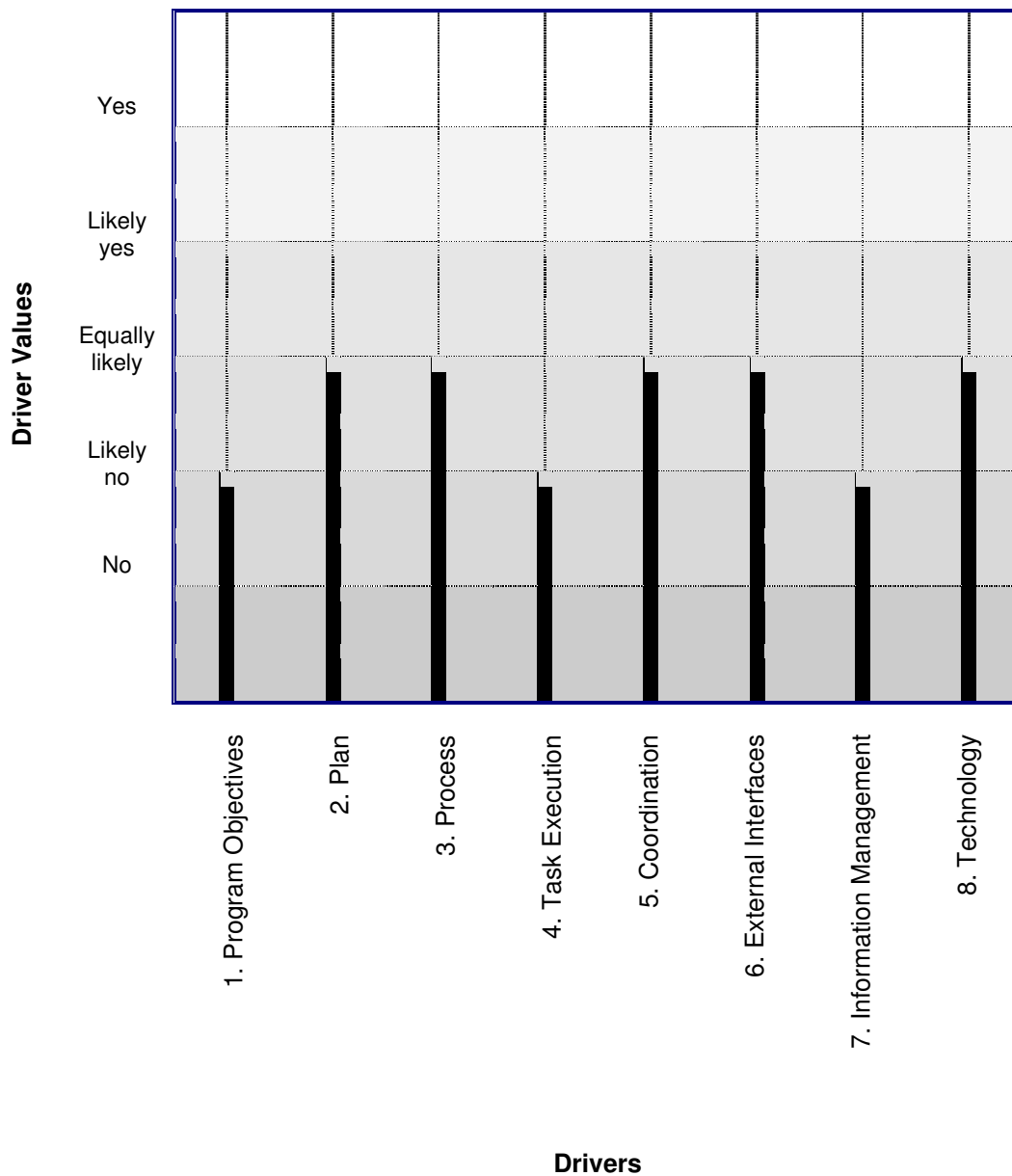
Driver Questions	Answer						Rationale
	No	Likely no	Equally likely	Likely yes	Yes	Not Applicable	
16. Will the system be sufficiently integrated and interoperable with other systems when deployed? Consider: Interfaces; applications; tools; hardware; data; technology maturity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17. Will the system effectively support operations? Consider: Business and operational workflows; support of organizational and enterprise missions; operational risk mitigation; disaster recovery, contingency and business continuity plans; technology maturity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
18. Have barriers to customer/user adoption of the system been managed appropriately? Consider: User acceptance; stakeholder sponsorship; transition to operations; user support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
19. Will people be prepared to operate, use, and maintain the system? Consider: policies; procedures; training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
20. Will the system be appropriately certified and accredited for operational use? Consider: compliance with policies, laws, and regulations; acceptable mitigation of risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Exercise 3B: *Graphing Results*

Directions

In this exercise, you will record the driver values from Exercise 6 on bar graphs. You will find blank bar graphs on the next two pages. Record your driver values on the graphs provided. If you marked any drivers as “Not Applicable” in Exercise 6, do not record any values for those drivers on your bar graphs. Below is an example of a completed bar graph for this exercise.

Partial Example



Driver Profile

Driver Answers/Values	Yes																				
	Likely yes																				
	Equally likely																				
	Likely no																				
	No																				
		1. Program Objectives	2. Plan	3. Process	4. Task Execution	5. Coordination	6. External Interfaces	7. Information Management	8. Technology	9. Facilities and Equipment	10. Organizational Conditions	11. Compliance	12. Event Management	13. Requirements	14. Design and Architecture	15. System Capability	16. System Integration	17. Operational Support	18. Adoption Barriers	19. Operational Preparedness	20. Certification and Accreditation
		Driver Questions																			

