

Accelerating Value Capture of SAP Enterprise Resource Planning (ERP) System: Governance Model and Process

By
Ting-Chih Shih

B.S., 2001, Computer Science, Carnegie Mellon University
M.S., 2004, Information Technology: Software Design and Management,
Carnegie Mellon University

Submitted to the MIT Sloan School of Management and
the MIT Department of Engineering Systems
in partial fulfillment of the requirement for the degrees of

Master of Business Administration
and
Master of Science in Engineering Systems

In conjunction with the Leaders for Manufacturing Program at the
Massachusetts Institute of Technology
June 2009

© 2009 Massachusetts Institute of Technology. All rights reserved

Signature of Author _____
May 8, 2009
Engineering Systems Division, MIT Sloan School of Management

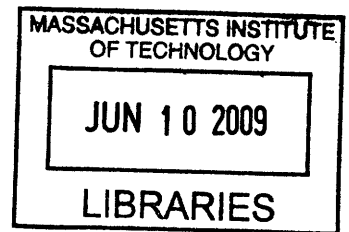
Certified by _____
Deborah Nightingale, Thesis Supervisor
Professor of the Practice, Aeronautics and Astronautics and Engineering Systems Division

Certified by _____
John Carroll, Thesis Supervisor
Professor of Behavioral and Policy Sciences, MIT Sloan School of Management

Accepted by _____
Nancy Leveson
Chair, Engineering Systems Division Education Committee
Professor of Aeronautics and Astronautics and Engineering Systems at MIT

Accepted by _____
Debbie Berechman
Executive Director of MBA Program, MIT Sloan School of Management

ARCHIVES



This page has been intentionally left blank.

**Accelerating Value Capture of SAP Enterprise Resource Planning (ERP)
System: Governance Model and Process**

by

Ting-Chih Shih

Submitted to the MIT Sloan School of Management and the
Engineering Systems Division on May 8, 2009 in Partial Fulfillment of the
Requirements for the Degrees of Master of Business Administration and
Master of Science in Engineering Systems

ABSTRACT

Raytheon produces a diverse range of defense products using a wide range of business systems and tools that are not currently integrated. To achieve the corporate vision of “one company”, in 2005, Raytheon began to deploy its SAP enterprise resource planning (ERP) system, called “PRISM”, focused on planning, sourcing, manufacturing, and delivery processes. After a few single-site PRISM deployments, in 2009, Raytheon launched its biggest deployment yet, to 7,000 users and two business units in California and Texas. This thesis explores effective governance models and post-deployment governance processes necessary to mitigate the anticipated performance dip and accelerate return on investment (ROI) of the SAP system.

The desired governance model for multi-business unit SAP ERP system includes comprehensive representation of stakeholders from business functional areas, information technology (IT) areas, user support groups, and SAP system experts. The governance structure consists of integration points among users, system experts, process owners, management, and corporate leadership team to ensure development of corporate system and solutions to address business unit needs. The governance process involves reviewing change requests, assessing changes needed, and deciding on final resolution. The governance structure and its linkages among different groups facilitate the process by involving the stakeholders with the appropriate knowledge and experience to contribute to decision making. The result is a governance structure capable of making just-in-time decisions to implement the “one-company” vision.

Thesis Advisors:

John Carroll

Professor of Behavioral and Policy Sciences, MIT Sloan School of Management

Deborah Nightingale

Professor of the Practice, Aeronautics and Astronautics and Engineering Systems Division

This page has been intentionally left blank.

ACKNOWLEDGEMENTS

I would like to thank Robert (Bob) Chatterson, Director of Production Control, Space and Airborne Systems (SAS), Raytheon, my supervisor, for sponsoring this internship and providing continuous support to ensure the success of this project. I would also like to thank John Zedro, Senior Director of Operations, Space and Airborne Systems, Raytheon, for being a supportive project champion. This project started with a “boil the ocean” scope of mitigating the performance dip from SAP implementation. With Bob’s help, introducing me to various stakeholders, we identified a feasible project scope focused on developing a governance model for Raytheon SAP implementation. I am infinitely grateful for the wonderful internship opportunity Bob created.

I would also like to thank Terry Bredehoft, Director of SAS IT, for welcoming me to the governance development working group. I would like to specially thank David Booker and Marilyn Gore for working with me on the governance model development and providing their insights and experiences on organizational change management. I would also like to acknowledge Todd Weissinger, Director of SAS IT at Forest, Mississippi for providing field feedback on SAP implementation and suggestions for improvements, and Carl Porter, Director of SAP Competency Center – Operations for contributing to the development of this thesis. In addition, many thanks to Chuck Lawrence and Linda Keenan who are leading PRISM user support groups, as well as Cecil Lillard, Launny Theis, Ann McCord and others from the PRISM team, and Kelly O’Dell, Clyde Lee, and Lynn Auvil from SAS Production Control for your input, advice, and support throughout my internship.

My thesis could not have been completed without the valuable insights, guidance, and support from my thesis advisors, Professor John Carroll and Professor Deborah Nightingale, who are both Co-Directors of MIT’s Lean Advancement Initiative, a research consortium providing products and tools to facilitate lean enterprise architecting and transformation. Finally, I would like to thank the entire LFM program staff for creating this incredible, enriching two-year journey that has changed my life forever.

This page has been intentionally left blank.

TABLE OF CONTENTS

Abstract.....	3
Acknowledgements	5
Table of Contents	7
1 Introduction	12
1.1 Motivation for Thesis	12
1.2 Thesis Approach and Organization	14
2 Raytheon SAP Enterprise Resource Planning (ERP) Implementation.....	16
2.1 Company Background	16
2.2 Project Overview	17
2.3 Goals and Objectives	17
2.4 PRISM Implementation	19
3 Literature Review.....	21
3.1 SAP Implementation and Deployment Best Practices.....	21
3.2 Determining Thesis Focus Area Based on Assessment of Raytheon SAP Planning Compared to Best Practices	26
4 Industry Lessons Learned from Research on Mitigating Performance Dip and Accelerating ROI of SAP Implementation	28
4.1 Case Study 1: Company A	28
4.2 Case Study 2: Company B	31
4.3 Case Study 3: Company C	32
4.4 Consulting Company Insights	35
4.5 Critical Success Areas to Address by Raytheon	36
4.6 Recommendation for Mitigating Raytheon Performance Dip	39
5 Organizational Assessment	40
5.1 Organization Structure	40

5.2	Stakeholder Analysis	43
5.3	Three-Lens Analysis	57
6	Governance Model Development.....	63
6.1	PRISM Governance Model Development Working Group.....	63
6.2	Governance Model Development Framework	65
6.3	Step 1. Analyze Enterprise’s As-Is and To-Be States Using Enterprise Views.....	68
6.4	Step 2. Develop Candidate Governance Models Using Enterprise Views	75
6.5	Step 3. Selecting Governance Models	86
6.6	Optimal Governance Model Description.....	88
7	Governance Process Development.....	94
7.1	Current Governance Process.....	94
7.2	Future Governance Process.....	96
8	Implementation Plan.....	98
8.1	Governance Structure Proposal	98
8.2	Implementation Plan	104
8.3	Change Management Plan	105
9	Conclusion and Next Steps	110
9.1	Summary of Findings	110
9.2	Future Areas of Study	110
	Acronyms	112
	Bibliography	114

LIST OF FIGURES

Figure 1. Raytheon material flow	12
Figure 2. ERP expected performance dip and ROI	13
Figure 3. Current and future ERP systems	17
Figure 4. PRISM implementation structure.....	19
Figure 5. Realized tangible benefits	21
Figure 6. Realized non-tangible benefits.....	22
Figure 7. Issues pre SAP deployment.....	24
Figure 8. SAP issues post-deployment.....	25
Figure 9. Comparing issues pre and post deployment.....	26
Figure 10. Raytheon corporate organization structure	41
Figure 11. Functional and program organization structure	42
Figure 12. Linkage structure among stakeholders.....	43
Figure 13. Stakeholder Relationships.....	46
Figure 14. Value Delivery to PRISM Team.....	48
Figure 15. Value Delivery to Raytheon Leadership.....	49
Figure 16. Value Delivery to End Users.....	51
Figure 17. Value Delivery to SAP Competency Center - Operations	51
Figure 18. Value Delivery to Raytheon Program Offices	52
Figure 19. Value Delivery to Function Directors.....	54
Figure 20. Value Delivery to User Support Organizations	55
Figure 21. Stakeholder Value Comparison.....	56
Figure 22. The PRISM program office organization.....	59
Figure 23. Current SAP ERP Governance Model	63
Figure 24. Governance development framework	65
Figure 25. Enterprise architectural views.....	66
Figure 26. Interrelationships of enterprise views	67
Figure 27. Example of interrelated enterprise views.....	68
Figure 28. Raytheon ERP governance overview.....	71
Figure 29. Current PRISM governance	72
Figure 30. STAR methodology	79
Figure 31. Distributed Governance Model.....	82
Figure 32. SAP-Centric Governance Model.....	84
Figure 33. Integrated Governance Model.....	85
Figure 34. High-Level Integrated Governance Model	89
Figure 35. Drill-Down of Integrated Governance Model.....	89
Figure 36. Optimal governance model	90
Figure 37. Current governance process.....	94
Figure 38. Change control process	95
Figure 39. Current change control review process.....	96
Figure 40. Desired future governance process	97
Figure 41. PRISM steering committee	98
Figure 42. Process Integration Council	99
Figure 43. PRISM process change control review board	100
Figure 44. PRISM change control review board	101

Figure 45. PRISM change control board 102
Figure 46. PRISM user support 103
Figure 47. PRISM sustainment..... 104

LIST OF TABLES

Table 1. Training benchmarks	24
Table 2. Stakeholder Value Exchange.....	47
Table 3. Pugh Matrix Selection Process results	87
Table 4. Comparing Current and Future Governance Structures	93
Table 5. Commitment Chart	106
Table 6. Capability Chart	107

1 Introduction

This chapter describes the motivation for thesis project and an outline of thesis organization.

1.1 Motivation for Thesis

Companies worldwide use enterprise resource planning (ERP) systems to coordinate all the resources, information, and activities needed to complete business processes such as order fulfillment, manufacturing, supply chain management, or billing. A single ERP system integrates data in discrete, legacy applications. By implementing ERP systems, companies can reduce costs from consolidated computer infrastructure, standardized software systems, and reduced number of software specialties required. Prior to ERP implementations, Raytheon used a wide range of disconnected non-integrated business systems and tools for its distributed manufacturing. As a result, program offices have little visibility of program progress. Figure 1 below illustrates the distributed and complex material flow material flow.

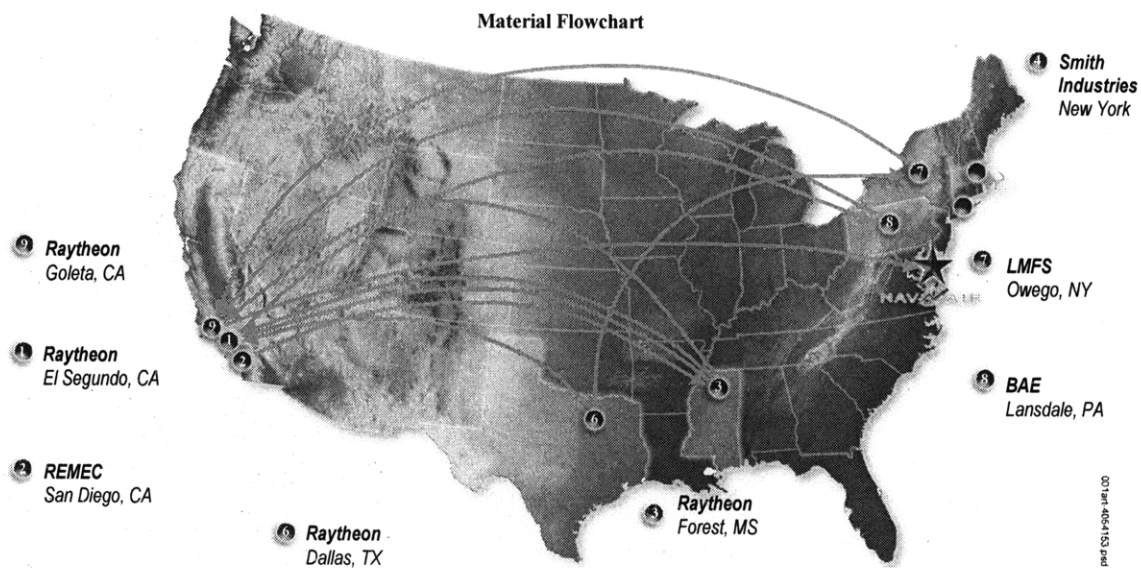


Figure 1. Raytheon material flow¹

One of the predominant ERP system providers is SAP, headquartered in Germany. SAP ERP systems have been implemented worldwide by enterprises ranging in product-line, size, and length of establishment aiming to streamline their operations and increase their bottom line. However, each company endures the inevitable “worse-before-better” phenomenon where company performance in productivity is expected to decline and eventually improve until performance exceeds the level of pre-SAP implementation.

¹ Business case- PRISM Gate 4_01-16-06rev1.ppt

The worst-before better phenomenon is depicted in Figure 2 as follows:

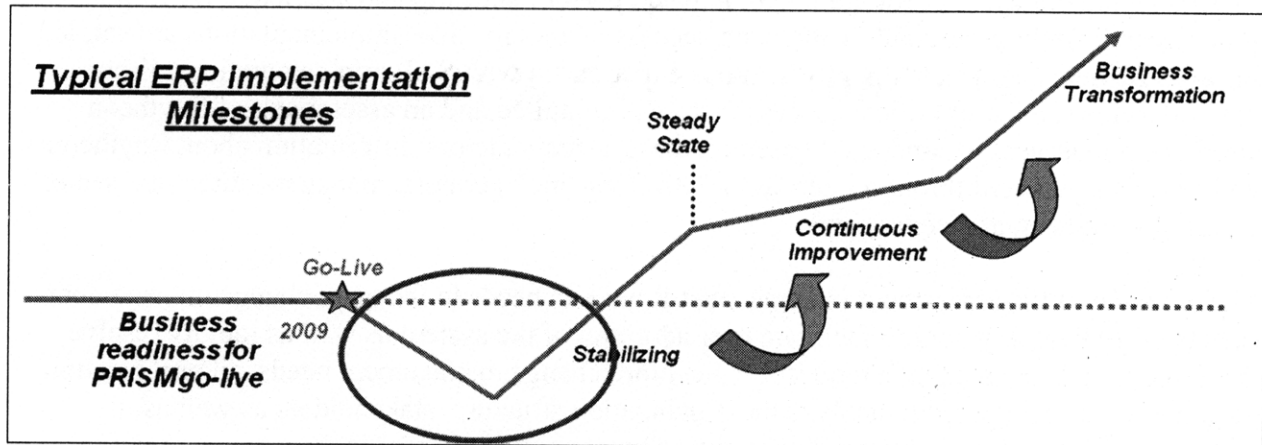


Figure 2. ERP expected performance dip and ROI²

The primary objectives of this thesis are to:

- Mitigate the performance dip in depth and duration post SAP ERP deployment
- Accelerate the ROI of implementation

The scope of this project aims to understand causal factors and ultimately minimize both the depth and duration of this performance dip. Areas of research include industry best practices to leverage lessons learned from prior Raytheon and industry SAP implementations, as well as methodologies to institutionalize process improvement changes necessary to accelerate ROI.

This thesis is aimed at minimizing both the depth and duration of the performance dip, as well as accelerating the eventual incline in performance and associated return on investment (ROI) of the system. This paper presents research findings, industry benchmarking results, and outcomes from workshops and interviews conducted with Raytheon employees, consultants, and other experienced SAP practitioners culminating in a governance model and an issue-resolution process to mitigate the performance dip and accelerate ROI of SAP implementation. The research was completed between the months of June and December of 2008 at Raytheon Company's Space and Airborne System (SAS) division in partnership with MIT's Leaders for Manufacturing (LFM) program. The content of this paper therefore reflects the analysis conducted during the internship period.

This thesis uses a lean improvement approach combined with an enterprise architecture design framework developed by the Lean Advancement Initiative (LAI)³ at MIT to develop the governance model and issue-resolution process to expedite decision making regarding critical SAP changes and roll-out of those changes to mitigate performance slow-downs.

² 2008_July 09_PC BRG_Chatterson.ppt

³ <http://lean.mit.edu/>

1.2 Thesis Approach and Organization

To achieve the objective of mitigating anticipated performance dip and accelerate ROI, first, prior research findings and publications on success factors for SAP implementations are studied followed by interviews with three companies experienced with SAP implementations. From these interviews, a list of critical success factors is compiled and an assessment of Raytheon deployment readiness is conducted based on these success factors. Information about Raytheon readiness was gathered through interviews with front-line operators, managers, directors, senior executives, trainers, and consultants.

The outcome of the assessment indicates that Raytheon needs to focus on change management aspects of SAP deployment to facilitate user adoption of the system as well as rapidly resolve user issues and system change requests. To explore change management needs, an organization assessment was conducted to analyze the organization structure, stakeholders as well as its strategic, political, and cultural environments. The governance model is then designed with considerations to Raytheon's current organization structure and underlying challenges to facilitate community adoption of the governance model.

To develop the governance model, an eight-view approach was used to closely examine the organization structure and associated processes as they pertain to SAP change management and decision making. The results from the eight-view analysis were used as criteria to design and select the optimal candidate governance model that would be adopted by the user communities. After the governance model is selected, a review of the governance process was done and a recommended process provided.

Lastly, an implementation plan was developed for the governance model and its associated issue resolution process. The conclusion section summarizes findings and describes future areas of research.

This thesis is organized into the following chapters:

Chapter 1 – Introduction: Describes the motivation and goals of thesis.

Chapter 2 –Raytheon SAP Enterprise Resource Planning (ERP) Implementation - PRISM: Describes the host organization, PRISM goals, program structure, and implementation tasks

Chapter 3 – Literature Review: Explores existing research on SAP implementation best practices and critical success factors to mitigate the performance dip and accelerate ROI.

Chapter 4 – Industry Lessons Learned on Mitigating the Performance Dip and Accelerating ROI: Describes three case studies of companies who have been performing SAP implementations for at least five years and results from consulting firm research.

Chapter 5 – Organizational Assessment: Describes three case studies of companies who have been performing SAP implementations for at least five years and results from consulting firm research.

Chapter 6 – Governance Model Development: Describes development steps and resulting SAP governance model for SAP

Chapter 7 – Governance Process Development: Describes methodology for developing a governance process and describes the proposed process to achieve just-in-time decision making to improve the PRISM system.

Chapter 8 – Implementation Plan: Describes a phased approach and associated change management plan to implement the proposed governance model and process.

Chapter 9 – Conclusion and Next Steps: highlights key findings and recommends future areas of research.

Acronym – Provides a list of acronyms used for quick-reference when reading thesis.

2 Raytheon SAP Enterprise Resource Planning (ERP) Implementation

This chapter provides an overview of Raytheon Company, the goals and benefits of implementing PRISM, and the implementation structure for PRISM.

2.1 Company Background

Raytheon Company, established in 1922, is a technology leader specializing in defense, homeland security, and other government markets throughout the world. With a history spanning more than 80 years, Raytheon provides electronics, mission systems integration, and other capabilities in the areas of sensing, effects, communications and intelligence systems, as well as a broad range of mission support services. Raytheon has around 72,000 employees worldwide and generated \$21.3 billion in 2007 sales⁴.

Raytheon has the following six business units⁵:

Integrated Defense Systems (IDS):

The IDS segment provides ballistic missile defense, including space, air, surface, and subsurface; naval; and maritime and homeland security solutions.

Intelligence and Information Systems (IIS):

The IIS segment provides integrated ground systems for signal and image intelligence; weather and climate systems; command and control solutions for air/space platforms; operations, maintenance, and engineering services; and information technology and homeland security solutions.

Missile Systems (MS):

The MS segment provides weapon systems, including missiles, smart munitions, projectiles, kinetic kill vehicles, and directed energy effectors.

Network Centric Systems (NCS):

The NCS segment provides net-centric mission solutions for network sensors, command and control communications, air traffic management, and homeland security.

Space and Airborne Systems (SAS):

The SAS segment provides integrated systems and solutions for advanced missions, including surveillance and reconnaissance, precision engagement, unmanned aerial operations, and special force operations and space.

Technical Services (TS):

The TS segment specializes in counter-proliferation and counter-terrorism, base and range operations, engineering and manufacturing services, and mission support. It primarily serves

⁴ <http://www.raytheon.com/ourcompany/>

⁵ <http://finance.yahoo.com/q/pr?s=RTN>

defense and government electronics, space, information technology, and technical services and support markets.

2.2 Project Overview

To achieve the corporate vision of “one company”, Raytheon launched various phases of SAP Enterprise Resource Planning (ERP) system implementations. The first phase of SAP was named Achieving Process Excellence (APEX)⁶, which manages financial data and human resource processes. In 2005, Raytheon launched its SAP enterprise resource planning (ERP) deployment, “Process Reinvention Integrating Systems for Manufacturing”, or “PRISM” to extend the use of SAP from APEX to a broad, integrated manufacturing operations solution. The second phase was launched at the MS business unit located in Arizona. In 2007, Raytheon deployed PRISM at an SAS facility in Mississippi as a pilot to a larger joint business, SAS and NCS, implementation including California and Texas sites. This PRISM deployment is scheduled for January 2009 and will affect approximately 7,000 users at four sites across California and Texas from SAS and NCS. PRISM includes functions supporting production planning, shop floor, quality, inventory, depot, and environmental health and safety.

PRISM will replace currently fragmented legacy systems that are used among various facilities with one integrated system that enables transparency throughout business units and end-to-end business processes. Figure 3 below is a depiction of the current and future state of ERP.

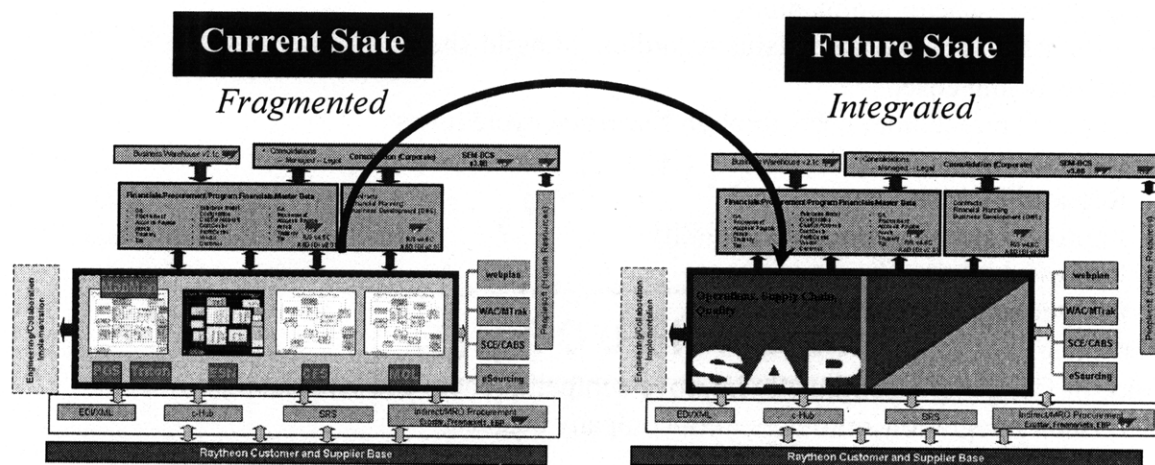


Figure 3. Current and future ERP systems

2.3 Goals and Objectives

The primary objectives of implementing PRISM are:

- To enable Program Managers to have an integrated view of programs
- To implement systems that enable Raytheon’s “One Company” objective

⁶ [http://ds.rms.ray.com/ds/dsweb/Get/Document-655898/PRISM%20Introduction1.pptnumber307,1,Introduction to PRISM](http://ds.rms.ray.com/ds/dsweb/Get/Document-655898/PRISM%20Introduction1.pptnumber307,1,Introduction%20to%20PRISM)

The benefits of implementing PRISM, according to Raytheon leadership⁷, are as follows:

One Company Benefits⁸:

- Improved ease of doing business with other units within Raytheon
- Improved real-time program visibility/oversight across the enterprise
- Improved program performance and more integrated supply chain
- Leverages investments made in prior SAP implementations

SAS/NCS Business Benefits

- Enables manufacturing strategies and affordability goals
- Drives growth and improved program execution
 - Lean manufacturing
 - Lower cycle times
 - Inventory efficiencies
 - Lower product support costs
- Enables retirement of many legacy systems

Program Benefits

Performance:

- Improved Program Execution
 - Integrated scheduling/planning
 - Total integrated program status regardless of build site
- Lower recurring costs
 - Reduced direct labor costs through shortened cycle times
 - Improved capacity utilization
 - Reduced Purchase costs
 - Improved supplier schedule/visibility
 - Improved buyer efficiencies
 - Greater support efficiencies

Relationships:

- Voice of Customer – continually improve competitiveness and affordability
 - System integration simplifies intra-company business
 - Maximizes integrated supply chain

Solutions:

- Reduced inventories through effective demand management
- Reduced capital through improved capacity utilization
- Increased flexibility via single system solutions throughout SAS/NCS Ops sites

⁷ 200707023_PRISM Awareness Town Hall_v001.ppt

⁸ http://docushare1.app.ray.com/docushare/dsweb/Get/Document-986240/Learn_More_About_PRISM.htm

2.4 PRISM Implementation

In order to implement PRISM across both SAS and NCS facilities in California and Texas, the PRISM Enterprise Team was formed to plan, execute, test and deploy the system. Figure 4 is a representation of the overall organization of the PRISM implementation⁹.

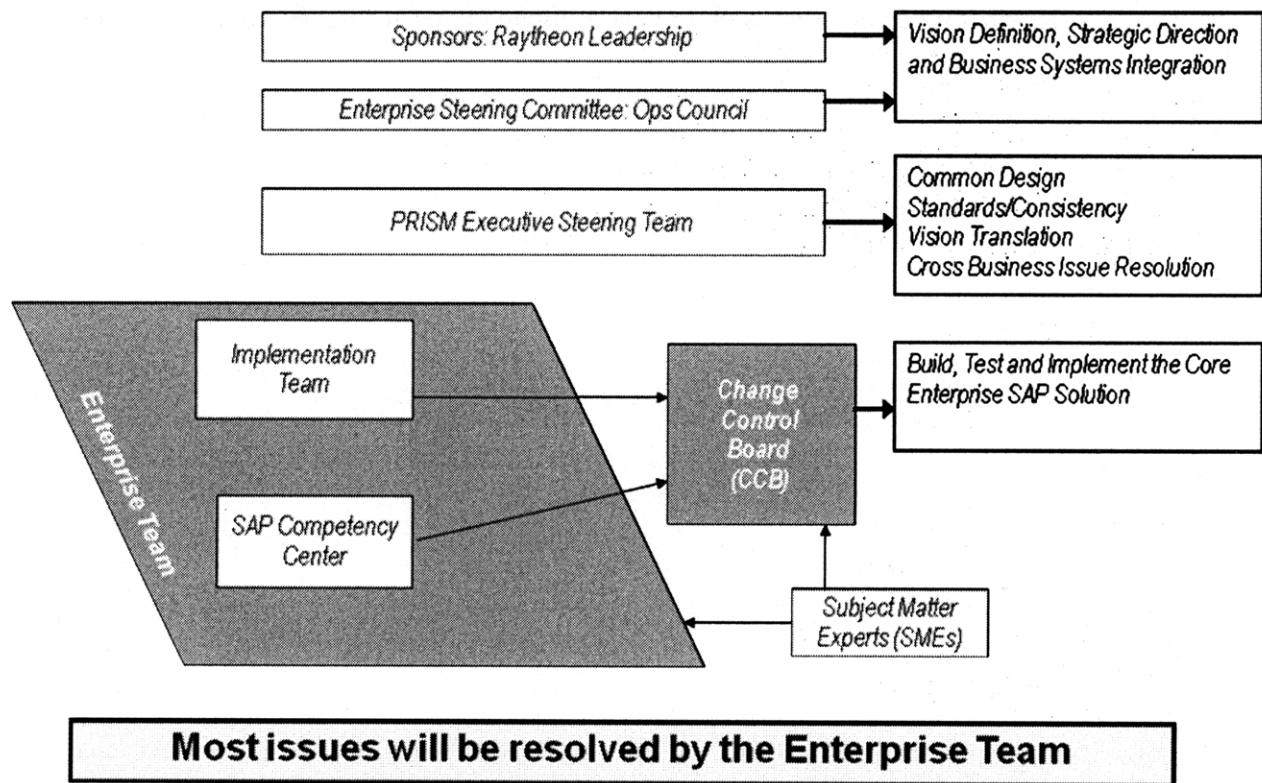


Figure 4. PRISM implementation structure¹⁰

The initiative was sponsored by Raytheon leadership. Through the Enterprise Steering Committee Operations Council, Raytheon senior leaders provide the vision and strategic direction to guide the system integration efforts for PRISM. Members of the Executive Steering Committee formed PRISM Executive Steering Committee to guide the implementation of the PRISM system to achieve the one-Raytheon vision through common system design and standardized processes. The PRISM Executive Steering Committee was also responsible for resolving cross business issues in order to obtain agreement among business units on the system implementation.

The PRISM Enterprise Team was formed under the leadership of the PRISM Executive Steering Committee to plan, implement, develop, and roll-out PRISM to all users. The enterprise team consisted of the PRISM core team and the SAP Competency Center. The PRISM core team

⁹ Source: Business case- PRISM Gate4_01-16-06rev1.ppt

¹⁰ Business case- PRISM Gate4_01-16-06rev1.ppt

drove all planning and implementation tasks. The SAP Competency Center is responsible for architecting, developing, and maintaining the PRISM system. Changes to PRISM are reviewed by the change control board (CCB) with input from subject matter experts (SMEs) from various business units.

The next chapter examines various literatures on SAP implementation and best practices to determine areas Raytheon needs to focus on to best mitigate the performance dip and accelerate ROI.

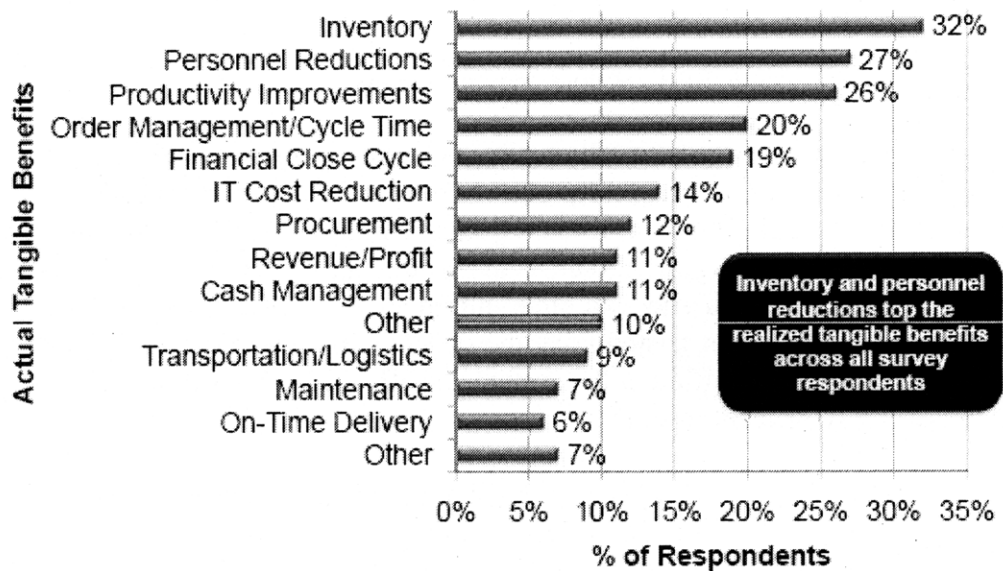
3 Literature Review

This chapter explores current findings from research groups and publications on SAP implementation and deployment best practices. The findings cite research conducted by Deloitte Development LLC describing current state of SAP implementation as well as its evaluation of Raytheon’s implementation. The literature findings provide insight on areas of focus to mitigate the performance dip and accelerate ROI of SAP implementation.

3.1 SAP Implementation and Deployment Best Practices

Implementation of the SAP ERP system is an on-going program with an expected performance dip of up to 25% within the first 6 months¹¹. The dip is expected due to the learning curve of the new system. Also, new business process mapping to software system features can contribute to performance dips due to process gaps. On the other hand, benefits of SAP ERP include material savings (inventory reduction), time savings (shorter cycle times), and people savings (personnel reductions). Non-tangible benefits include better quality of information and access to information, improved customer responsiveness, and improved processes⁸. The survey result conducted by Deloitte Consulting and Benchmarking Partners showing realized tangible benefits based on a study of 62 companies that have gone live with an ERP system is shown in Figure 5.

Realized Tangible Benefits



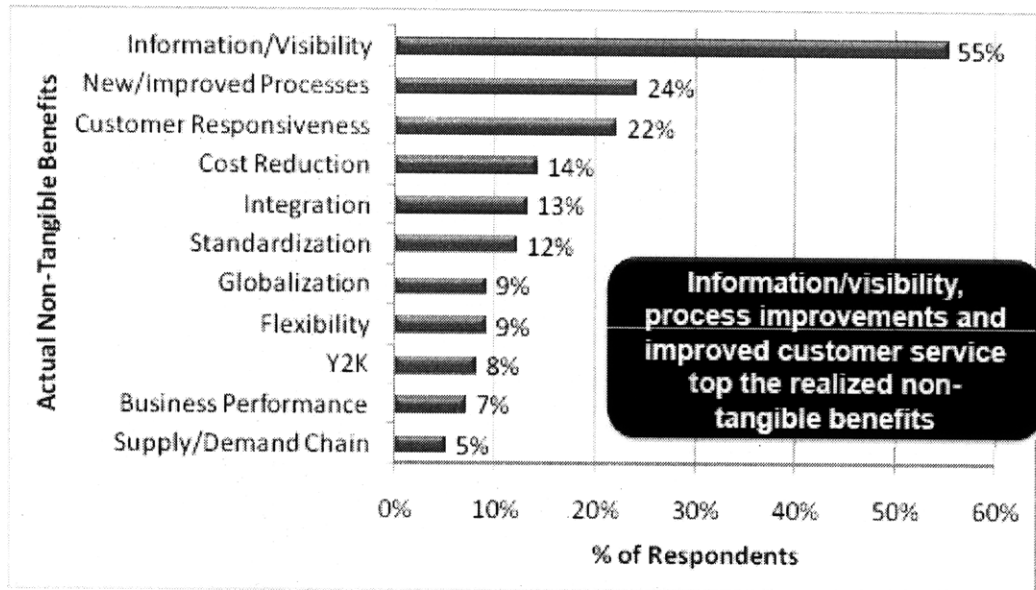
Source: Deloitte Consulting and Benchmarking Partners
 (Based on a study of 62 companies that have gone live with an ERP system) Note: Rounded percentages. Based on multiple answers per respondent
 Copyright © 2008 Deloitte Development LLC. All rights reserved. 13

Figure 5. Realized tangible benefits

¹¹ Deloitte Development LLC study, 2008. Post-Production Productivity Gap Analysis FINAL.pdf

A similar study was conducted to assess non-tangible benefits as shown in Figure 6.

Realized Non-tangible Benefits



Source: Deloitte Consulting and Benchmarking Partners
 (Based on a study of 60 companies that have gone live with an ERP system) Note: Rounded percentages; Based on multiple answers per respondent
 Copyright © 2002 Deloitte Development LLC. All rights reserved.

16

Figure 6. Realized non-tangible benefits

Unlike other IT systems and tools, in order to fully realize the expected return on investment (ROI) of an SAP system, organizational business processes need to be adjusted instead of expecting the SAP system to be tailored to fit business needs (Turban et al 2008, 300-343). SAP is a full suite software package that integrates all areas of manufacturing operations. Therefore, a change in the SAP system software will affect all other interrelated processes. Also, as SAP provides new software upgrade releases, customizing the system will require software updates to be iterated through each customized portion of the system, usually a time-consuming, error-prone undertaking requiring significant resources.

To implement an SAP system, first, a map of current business processes is necessary to prevent failure of ERP projects (Brown and Vessey 2003). This analysis should map out all present operational processes, enabling implementation of SAP with its standard modules aligned with the established organization. Redesign can then be implemented to achieve further process congruence.

Research indicates that the risk of business process mismatch is decreased by:

- linking each current organizational process to the organization's strategy;
- analyzing the effectiveness of each process in light of its current related business capability;

- understanding the automated solutions currently implemented (King 2005) (Yusuf, Gunasekaran, and Abthorpe 2004, 87).

According to Victor Portugal and David Sundaram, in their book, *Business Processes: Operational Solutions for SAP Implementation*, the critical success factors for implementing SAP include establishing systems as follows:

- Clear objectives
- Project team has good organizational structure
- Project team is highly competent
- Good communication processes among members of the project team and between the project team and key stakeholders such as users, power users, and decision makers
- Ability for the project team to make quick decisions regarding what needs to be done, e.g. which processes need to be reengineered.
- Inclusion of key power users and end users early on, before end of test, but right in the beginning to increase acceptance of decisions with respect to users.

One critical aspect of SAP adoption is training. Based on a Deloitte Consulting study conducted for Raytheon, Table 1 below shows examples of recent benchmarking of training approaches.

Benchmark Description	Best Practice Characteristic
<p>Large global manufacturer: Global SAP deployment to service parts business. Developed a full-set of training simulations for warehouse workers so that they can receive, sort, handle exceptions, pull and then pack the material. They will have this in-warehouse training lab up and running for the 30 days prior to go-live.</p>	<ul style="list-style-type: none"> • Hands-on with real-life data • Learn in a lab environment • Practice exception conditions • Immersion in usual surroundings • Immediately prior to go-live • Power users deployed to deliver training and support
<p>Large diversified food processor: Global SAP deployment across all of manufacturing and marketing offices. A section was set-up at each facility to practice in a real life environment with raw materials. Workers to practice through SAP while actually pulling material and running it through a production process. They could then follow how SAP tracks production at each stage and what the system and screens are doing.</p>	<ul style="list-style-type: none"> • Real-life environment • Follow through system and non-system procedures • Complete end-to-end processes with hand-offs • Repetitious practice • Comprehensive program for power users

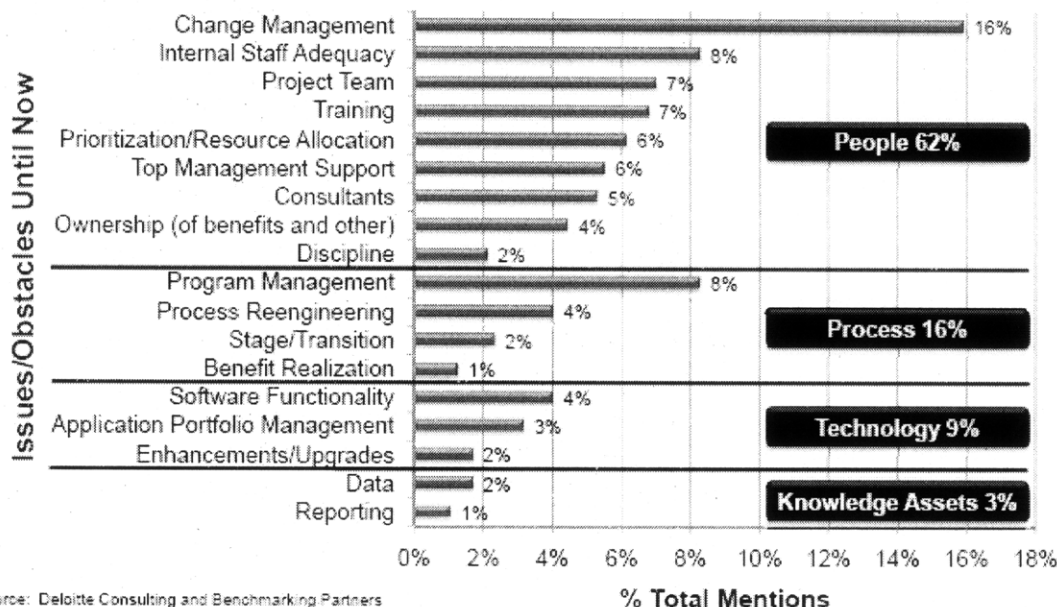
<p>Business Technology and Electronics Manufacturer: Global Oracle deployment. Project established learning labs for all of their professional workers to come and work on the system, ask questions, and basically work through a day-in-the life scenario. This will be up and running for the 30 days before go-live.</p>	<ul style="list-style-type: none"> • Day in the life scenarios • Learning labs • Immediately prior to go-live • Post go live support
---	--

Table 1. Training benchmarks

Moreover, during implementation and post-deployment, people related issues dominate followed by process related issues. According to Deloitte Consulting and Benchmarking Partners, a study of 62 companies that have gone live with an ERP system indicates that pre-deployment, 62% of the issues are people related, followed by 16% of process-related issues. These include change management with the significantly higher percentage of 16%, internal staff adequacy (8%), project team, training, prioritization/resource allocation (6%). The result of the study is shown below in Figure 7.

Impact on People: Issues Until Going Live

People related issues dominate during implementation.



Source: Deloitte Consulting and Benchmarking Partners
 (Based on a study of 62 companies that have gone live with an ERP system)
 Copyright © 2005 Deloitte Development LLC. All rights reserved.

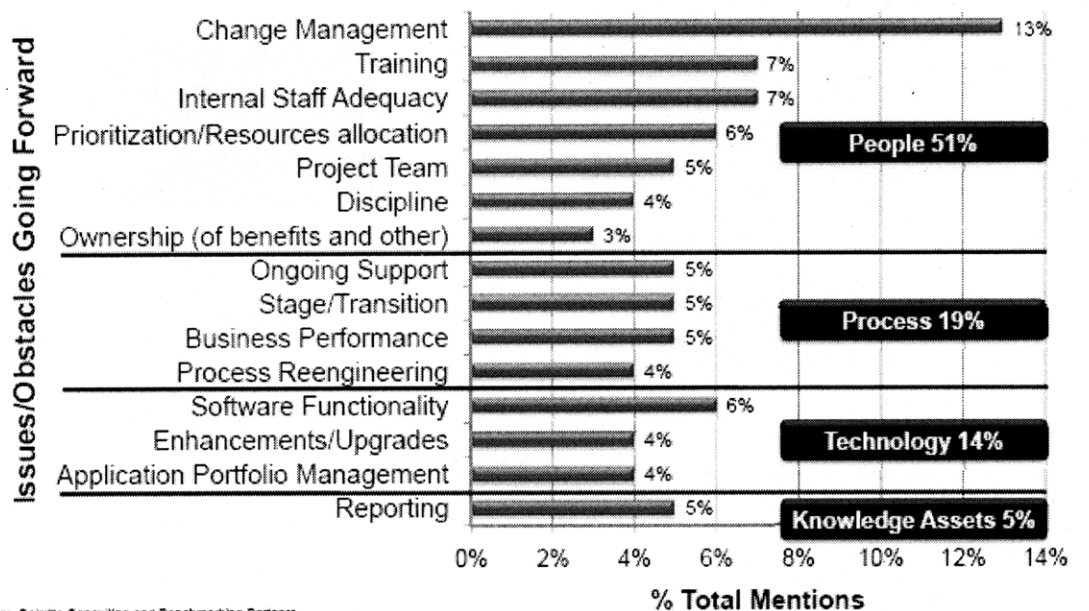
Note: Rounded percentages. Based on multiple answers per respondent
 Not all categories displayed

Figure 7. Issues pre SAP deployment

Another study conducted on issues post-deployment shows a similar pattern with 51% people related issues and 19% process related issues. The result of the study is shown in Figure 8 below.

Impact on People: Issues Going Forward

People related issues continue to dominate going forward.



Source: Deloitte Consulting and Benchmarking Partners
 (Based on a study of 62 companies that have gone live with an ERP system)
 Copyright © 2009 Deloitte Development LLC. All rights reserved.

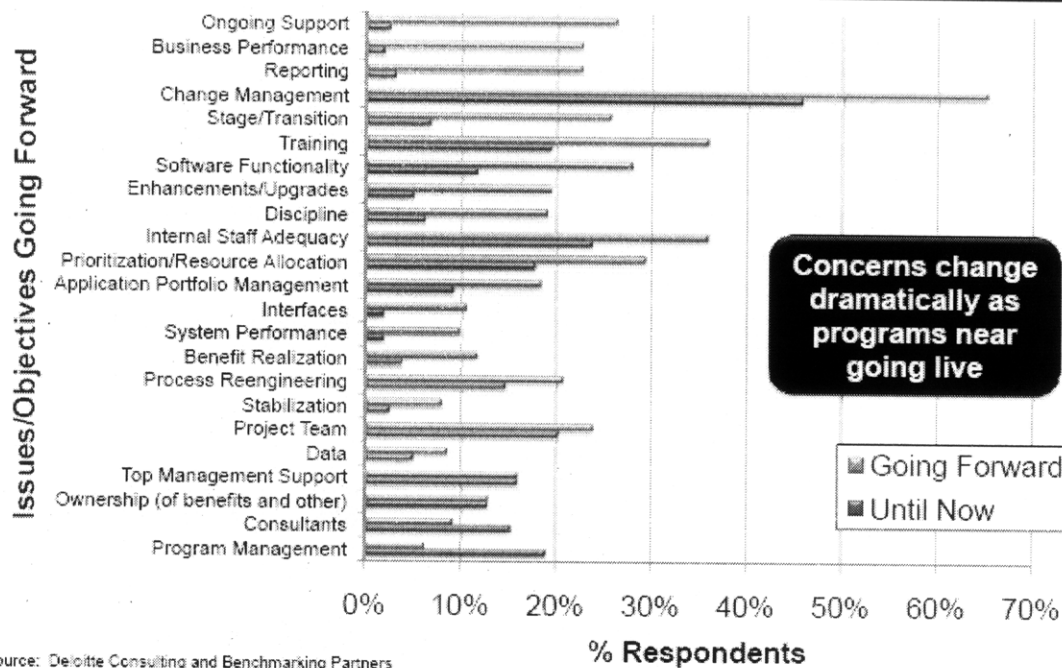
Note: Rounded percentages. Based on multiple answers per respondent.
 Not all categories displayed.

44

Figure 8. SAP issues post-deployment

Also, comparing issues pre and post-deployment, concern for change management preparedness changed the most among poll participants, from 45% (now) to 65% (going forward), a 20% increase in the number of people who are more concerned about change management preparedness post-deployment. Secondary concern is internal staff adequacy, the followed by training, and prioritization/resources allocation. The result of the comparison study is shown in Figure 9 below.

Changing Issues: Comparison



Source: Deloitte Consulting and Benchmarking Partners
 (Based on a study of 62 companies that have gone live with an ERP system)

Copyright © 2008 Deloitte Development LLC. All rights reserved.

Note: Based on multiple answers per respondent

Figure 9. Comparing issues pre and post deployment

Based on these study results, most SAP implementation issues are people-related. The next section will investigate people issues, particularly the structure of Raytheon PRISM implementation team as well as user training plan.

3.2 Determining Thesis Focus Area Based on Assessment of Raytheon SAP Planning Compared to Best Practices

This section explores people-related issues concerning the implementation team and user training and concludes the thesis focus should be centered on change management. Raytheon has a robust implementation team, PRISM Enterprise Team, composed of star performers from each of the business functions that will be affected by PRISM implementation. The team reports to the executive steering committee composed of vice president leadership within Raytheon. The PRISM team works with Deloitte consulting to develop the blueprint of system implementation, system design, testing, change management, etc. The team is well organized and communication processes are established. However, due to the complexity of the project and the involvement of multiple business units, the team’s ability to make fast decisions is hampered. Major changes to the PRISM system may require approval from the executive steering committee which may take weeks to months. Some of the decisions include funding for training, resource allocation for system testing, etc. Each task is critical to the success of PRISM deployment; however, the team must work with limited resources and timeline. Also, Raytheon could include more users early

during the project and involve them in system tests. Currently, the functional process experts are involved in system testing and business process reengineering, and limited number of users is selected as business power users (BPUs) to learn the system. Going forth post-deployment, the PRISM Enterprise Team will disband. Its current tasks in process mapping and maintenance, change management, training, and user support will need to be transitioned post-deployment.

In terms of training, Raytheon has deployed training to nearly 100% of its users. However, due to project deployment delay from the initially planned April 2008 launch date to the Jan 2009 launch date, refresher training needs to be provided with decreased budget allocation. Raytheon groups depend on its business power users (BPUs) to conduct training. In addition, various function groups (but not all) send portions of their teams to observe PRISM operations at Tucson MS site and Forest SAS sites. Given sufficient funding, or time for planning, day-in-life hands-on scenario training should be provided. Based on interviews with users, most users indicated that they are not prepared to use PRISM but are hopeful that the PRISM support team will facilitate system adoption.

This thesis focuses on post-deployment efforts to mitigate the performance dip to fulfill tasks currently conducted by the PRISM Enterprise Team, particularly in change management. The next chapter examines how other companies manage to mitigate the performance dip and accelerate ROI of SAP systems.

4 Industry Lessons Learned from Research on Mitigating Performance Dip and Accelerating ROI of SAP Implementation

SAP is a widely used enterprise resource planning (ERP) system. To mitigate initial performance dips from SAP deployment, interviews were conducted with the director of SAP deployment centers from three similar-sized aerospace companies to capture learning from SAP implementation experiences.

4.1 Case Study 1: Company A

Company A¹² has five years of SAP implementation experience. It has merged with more than fifteen businesses. Since implementing SAP, it has reduced its three thousand plus systems to just a few hundred. In the year 2007 alone, it deployed SAP systems at thirteen sites. After five years of implementing SAP systems, on average, productivity level resumes within two months and output goals can be achieved within 30 days. Moreover, output goals can be exceeded (by twofold) within three months.

During the initial SAP implementations, for a deployment of 1500 users, it took six to nine months to achieve normal operations (based on number of on-time shipments). Currently, for about 1000 users, it takes just a few weeks to achieve normal operations. The reduction in time to normal operations is mostly due to reuse of software and processes already in production. On average, the time from SAP deployment planning to launch (including mapping business processes, data conversions, etc.) is about eight months. Company A also provides 45 days of support post deployment.

The SAP deployment process used at Company A is as follows:

1. Start with blueprint for business future state with SAP (starting at sites with similar business processes)
2. Configured the system prior to arriving onsite with system experts (e.g. in a prototype fashion).
3. Learn about site processes
4. Within the first week, show site how their system would work and indicate, "Here's your system, and how it's going to work as the corporate system". This indicates to the site that it must conform to the corporate system.
5. First month: determine fit-gap where site proves why their process requires software change. Company A usually does about 10 software changes.
6. Within two months before go-live, do three cycles of mock data loads and tests. First cycle with core team on site, second with business power users (BPUs), third with users trained by BPUs
7. Train (on the job training during testing, and one month before go-live)
8. Support (60 days warranty period) using same subset of team and consultants
9. Replicate system for other sites (re-use as much as possible)

¹² Source: Interview with Dan Strow, SAP Deployment Director, Honeywell, Phoenix, AZ)

4.1.1 Key Learning Points

Key learning points were obtained from interviews with Director of SAP deployment program from the organization. These learning points are organized by the stage of deployment: pre-deployment, post-deployment, leadership, and lastly, training and testing.

Pre-Deployment

One of the most important success factors is getting leadership buy-in early. Having strong senior leadership support motivates the rest of the organization to collaborate on the initiative. Furthermore, having an implementation team of star players is important to help design processes for the future as well as influencing other users to adopt the system. More importantly, users should be brought onboard early during the planning effort to provide comments and input on usage needs as well as start developing knowledge and experience for future implementations.

Another key to mitigating performance dip is minimizing software changes. With the baseline design in place, implementation at additional sites focuses on process re-engineering, data conversion and training exercises more so than software rollouts. This expectation should be set early with new sites. During deployment planning, sometimes requirements placed on by customers need to be challenged. Often what is sincerely believed to be a “government requirement” is often “just the way it has been done for 20 years.” To challenge requirements, request to view the actual contract (or law) dictating the requirement.

From the business perspective, it is critical to ensure that the business is in good health prior to go-live, e.g. inventory levels, shipment levels, normalized over number of people, faulty data removed, etc. If business is not in good health, it would be hard to ensure on-time deliveries with the deployment of a new system, which can cause delays in shipments further affecting business health.

Post-Deployment

Post-deployment period is also known as the “warranty period” when the deployment team is fully dedicated to supporting users. This period is usually 30 to 60 days. During post-deployment support, the deployment team should set up conference line or ticket system and staff someone on call for 24 hours. Also, a governing board should be established to make decisions on implementing enterprise-wide changes and improvements. The governing board should have a leader for each function. Furthermore, particular decision makers should be designated within the governing board. These decision makers should have knowledge of the operational functions and at an authoritative level to drive changes within the organization.

Leadership

In terms of organizational leadership, managers of each site should gain buy-in from subordinates before roll-out. To reinforce employee commitment to adopting the new system, managers should include SAP adoption in personal performance objectives and associate personnel bonus with SAP success. To become a role model for the team, managers need to know how to do their job on the first day to ensure their department is ready for SAP deployment. Moreover, management from top, middle, to bottom needs to show full support of

SAP, e.g. senior leadership ensures their vice presidents support the initiative. Oftentimes, although senior managers are fully supportive of SAP implementation, messages pertaining to SAP adoption tend to get lost to middle management. SAP deployment teams should use manager briefings to address middle managers directly while a senior leader is in attendance to emphasize the importance of SAP. During these meetings, attendance should be tracked and reported to first level leadership.

Training and Testing

An effective way to do testing and training is to conduct “day in the life” to simulate first few days of deployment. According to the Director of SAP Deployment of this company, this is called Value Chain Confidence Testing (VCCT) where users are told to bring their job aid and pretend it is their first day live. They are encouraged to pick the parts and orders that they use in their regular jobs. Users usually find data, process, and security issues that were missed on earlier iterations of testing. This process proves that the system works, the data is viable, and that the users are ready for operations. Users also indicate this is when they really learned how to use the system rather than while looking at slides or doing exercises in the class room. It is also an input to the business unit’s “vote” to whether it is ready to go-live. As training and testing tasks are critically important, extra time should be allocated to facilitate user adoption of the system.

Training should be conducted based on users roles. For operators, the most effective training method is learning by doing. Also, dedicated trainers should be available to answer questions and provide help. The training materials such as user guides and job aids should consist of the minimum amount of information needed for the user’s daily task. For buyers, planners, engineers, the training should help them understand concepts and how systems are integrated, as well as system input effects upstream/downstream. It is important that 100% of the people are trained prior to roll-out.

It is also helpful to have actual users help with training. According to Director of SAP Deployment Center of company A, “There are 900 operators at this site. If we get 300 operators for 8 hours before go live and come in and say, ‘find you work cell in the system and start working whatever is there.’ Throwing bodies on the system is a good way to validate your data and that the system works. Training needs to go all the way to shipping, and cannot be tested on pristine data; it has to be real trial data. Having people train on data they generated helps ensure the end-to-end system works.”

One way to validate training is completed is to conduct an “Asset Test”, which ensures people are trained, system works, and the data conversion is correct. This is done by bringing in trained users, giving them the work instructions, and asking them to log in and do their job. For example, if they users can print the order forms, this indicates that they are trained, the system works, and the data conversion is right. Furthermore, users need to be able to execute all test scenarios with legacy data with actual operators, without consultants (from placing order to shipping product to ensure data is clean and operators can use the system)

4.2 Case Study 2: Company B

Company B has been implementing SAP at its various sites for about five years. It has used a multi-site (big bang) deployment approach. The performance dip in terms of productivity level experienced was about six months. Subsequent deployment encountered a smaller performance dip due to adequate post-go-live support to mitigate the dip.

Company B uses a general process for SAP implementation:

1. Design the system
2. Establish training group to develop training
3. Provide training 1-4 weeks prior to go-live
4. Launch system
5. Provide post go-live support

4.2.1 Key Learning Points

Key learning points were obtained from interviews with consultants of SAP deployment program from the organization. These learning points are organized by the stage of deployment: pre-deployment, post-deployment, and training.

Pre-Deployment

Prior to deployment, it is important to make sure that users have practiced on the system before go-live. Many companies often do not provide enough resources to help users practice using the system before go-live. More specifically, ensure first transactions are completed correctly because mistakes made during the first set of transactions are likely to cause aggregated mistakes further into the process. To mitigate risk of shipping delays due to SAP deployment, products should be shipped ahead of time.

A business freeze period should be set to ensure there are no changes in purchase orders after a set date in order to complete all data conversions in preparation for deployment. During this period when system is being prepared for deployment, there should be alternative ways for business to capture needed data.

Post-Deployment

One of the most important tasks to mitigate performance dip is to prevent multiplication of mistakes. For example, user A tells everyone else about a workaround that causes errors downstream, and thereby multiplying mistakes. In addition, some users like to remind people how to work the same tasks in the legacy system. Therefore, controlling myths, rumors, and other inaccurate statements are important. More importantly, appropriate communication channels need to be established to ensure everyone is operating in SAP correctly.

Also, user groups should be established so users can share knowledge with one another to mitigate mistakes. It is also important to ensure middle management does not deviate from correct procedures and that business power users (BPUs) are aware of steps being executed. Most people intend to follow procedures, however, during busy times, they tend to do whatever

it takes to complete the job. Having a BPU looking over users can help prevent and correct errors. Also, proper documentation should be captured to track and correct mistakes made as it can take months to correct a mistake made during the first week. Lastly, anticipate common mistakes. For example, common help provided on day one is user logins, for day two is releasing orders, for day three is addressing exception messages, etc. To track mistakes, identify where the mistakes occur within the business process and how often the mistakes occur.

To support users, the right levels of first-responders need to be determined in order to address user concerns. This is typically the BPU. To best address user issues, it is important that the SAP support team can properly prioritize change requests.

Training

Training should be planned to get users involved in testing as soon as possible. Training and certification courses should be developed to ensure users can do their job without reliance on the guide book. Periodic refresher training should also be provided to reinforce correct system operating procedures are followed. Also important is to have full-time power users to help/train on the job.

4.3 Case Study 3: Company C

Company C has more than eight years of SAP implementation experience (since Jan 2000). It has deployed at 15 to 20 sites, over thirteen states and will complete SAP deployments for all major sites by 2011. It deploys at one business unit every January starting with planning in March. Each deployment consists of one business unit and at least one facility, approximately 1,500 to 2,000 users. Its executive steering committee (all VPs involved in business planning) determines priorities for roll-out. Its expected performance dip is about three months.

Company C uses a cyclical process for planning and deployment of SAP:

Jan-Mar: deploy and post-deployment support

- **Jan:** Deploy at new site (2 weeks) with minimum of full month of on-site support for stabilization period (avoids financial risk at the end of the year and allows first quarter for recovery). Deployment staff spends full time on site for post-deployment support. Its BPU's wear blue shirts for easy identification by users. Deployment support is intense for the first week. The project managers on business and IT sides manage the "command center" to address user issues until the stabilization period is over.
- **Feb:** start tapering back by business areas (spend half the time as in Jan; SME are first-line of support)
- **Mar:** taper back more (SMEs only).

Mid Mar-Mid Oct: Plan for new site (team formation, data mapping, requirements definition, coding/construction, reporting, and mock tests). These tasks includes extracting data out of legacy system and converting them into production-like environment according to order of precedence (e.g. master data before inventory). After data conversion is completed, users at the site can log onto the mock environment and perform integration testing.

- **Mar:** The implementation team of subject matter experts (SMEs) within the functional area who are familiar with SAP operations sit with the site users and execute the tasks jointly, describe processes, and explain the error messages to help train users.
- **April-May:** This phase is called “shadowing” when the leadership teams from various sites (2-5 people per site) operate in SAP for a week. E.g. the manufacturing supervisor, the inspector would spend time with someone they can relate to, and see how they do the job within the system.
- **Oct-Dec:** Train 100% of the users. Most training sessions are conducted during lunch time with hands-on simulation, videos, whiteboard, and power point presentations.

4.3.1 Key Learning Points

Key learning points were obtained from interviews with Directors of SAP deployment program from the organization. These learning points are organized by the stage of deployment: pre-deployment, post-deployment, and training.

Pre-Deployment

Based on Company C’s experience, the amount of software customization directly impacts schedule. According to Director of SAP Deployment Center, “Customization is by far the single biggest factor increasing project duration exponentially...smoother implementation can be achieved by changing business processes to fit SAP.” To minimize software customization needed, the implementation team needs to investigate what business processes and system changes are needed during the initial implementation. Also, the implementation team should anticipate challenges with managers who are resistant to change and allocate more time with managers to demonstrate the need for and benefits of the system. Also, the tone at the corporate leadership level is important. The tone should aim at addressing user issues in order to progress on system adoption. In the past, some of Company C’s project teams did not want to admit that their project schedules were slipping, and users did not want to admit that they did not know how to use the system.

Post-Deployment

Company C has a robust governance model. A Change Control Board (CCB) was implemented to develop and approve enterprise solution. Each functional area has a CCB with approvers and business partner for every functional area. CCB board lead oversees the board and all the IT leads along with business partners, hosts meetings twice a week with Software Engineering manager (IT manager), business partner, and chair of CCB (operations program manager).

All change approvals are done through business and IT partners. Each function has a business partner (full-time SME) and an IT partner to address changes needed and gain approval for change. Changes are approved through ERP CCBs. The two (business and IT partners) also implement approved changes and track performance post-change via reports. Every VP owning a business process has their own IT project manager (PM) who serves as liaison between business and anything IT related, including ERP issues. The IT PM has a lot more one on one with the user base, sits in VP meetings, hears about problems and researches the problems.

In terms of solution prioritization, when an issue is reported, the functional area reports to the business partner manager, who prioritizes with other incidents at the team CCB. For emergencies, business partner and IT lead determine problem criticality. If critical, the issue will be handled as an emergency with 24-hour turnaround time where IT does unit testing, business partner does integration, tests on box, and then rolls out the change.

To estimate work needed to develop a solution or address a change request, the IT lead takes the solution and breaks it into work packages and estimates person hours for the work package, then sends the estimate and change to CCB. To develop and validate a solution, the IT lead does the development, and the business partner does testing as well as determining hands-on training needs. Changes made are communicated through emails or workshops.

In terms of change requests, when a change request is received, CCB makes sure requests are truly valid and that management agrees. Research is also done to avoid replicating a legacy work practice, or in contradiction with policy. In this process, by the time a change request arrives at the CCB, most of the issues should be hashed out with business unit and CCB members. IT lead describes issue, the solution, test results, etc. CCB lead then calls for approval from IT manager and business partner manager. If they both approve, CCB lead approves.

Company C learned that having both IT and business partners is more efficient than waiting for business to collect requirements, form a team, etc. The business partner serves as the go-to person when changes are discussed internally. The dual team approach of business and IT partners can facilitate prototyping. The business and IT change teams can go to their respective staff meetings to discuss process deltas between legacy and SAP. Additionally, the businesses have someone whom they trust and whom knows the business process and can translate requirements and oversee it to make sure there is no misrepresentation. This also helps the businesses feel like they are a part of an event rather than the victim.

To enhance organizational learning, Company C uses a through comprehensive, searchable lessons learned database. After resolving an issue, lessons learned session is conducted among the business and IT partners, along with others involved in resolving the issue, sometimes involving the users.

Training

As training needs to be conducted pre-deployment while users are occupied with daily operational tasks, the implementation team should anticipate difficulty to pull users for training. Some functions/sites brought in contracting help. In addition, training can be conducted as lunch meetings with manager presence and open up meeting for user questions.

To help users learn, the training team can try to link up users with similar roles and have them share each other's learning. During training, focus on exception processing and ensure documentations are comprehensive. Training materials can be a combination of slides, whiteboard drawings, and videos to talk through process in a flow chart, and execute steps

demonstrating process flow. These materials should be made available to trainees prior to the session if appropriate. Also, training should always include a hands-on portion. Lastly, Prior to conducting a training session, training materials should be made accessible.

4.4 Consulting Company Insights

In addition to industry interviews, Deloitte Consulting provided the following list of best practices for SAP implementation during its SAP implementation engagement with Raytheon.

- **Users learn what is relevant, in a manner that will be specifically useful to them**
 - Critical user groups identified and prepared for change prior to receiving training
 - Hands-on, role-based, and blended training approach covering both common and exception processes
 - Robust dedicated training environment with refreshable data and scenarios that reflect a user's job
 - Different delivery options based on audience needs - not everyone learns the same way – and close to go-live to improve retention levels
 - Close integration and involvement of process team in development, review and delivery
- **Training simulation approaches are expensive, and alone are not adequate**
 - Ideal for basic navigation and transactions and post-go-live support
 - Pays for its investment where scale, diverse delivery and certification is required, and ongoing new user training is needed
- **Engage power users early and often**
 - Business power users are critical to successful implementation – make them part of the team at beginning
 - Engage BPUs early and prepare them for role of becoming the expert users and system trainers
 - Define clear responsibilities and metrics for BPU performance to monitor their progress in terms of system usage and ability to train other users
- **Users need to know what is changing**
 - Clear process, policy and procedures
 - Rigorous change impact analysis by user group to understand changes to jobs
- **Plan the transition**
 - Map current job roles to future job roles based on transactions and security profiles
 - Redefine organizational structures as needed
- **Manage obstacles to change**
 - Address the reasons why people don't want to change
 - Assess change risk/readiness and develop mitigation plans to address barriers to change
 - Identify leaders and managers who will remove barriers – find the champions/evangelists
- **Over-communicate by factor of 10x**
 - Messages need repetition to sink in

- Find the credible communicators – aim the communications with deadly accuracy
- Facilitate interactive exchange of information - expos are great for awareness but do not help users know how their job will change
- Test effectiveness of messages (are they reaching the right level and are they being understood).
- **Keep to plan and focus on team performance**
 - Clear roles, responsibilities and escalation paths
 - Integrated work plans from each thread
 - Frequent communications to team and across team
 - Properly resourced and experienced training, communications and change management teams
- **Link business transformation project to business case in an understandable manner**
 - Identify opportunities to link process changes to the business case
 - Make users the owners of the business case – non-believers are hard to bring along
- **Go-live is NOT the finish line**
 - Sustain leadership involvement
 - Power users are empowered and supported by project
 - Systematic refinement to organization and job changes
 - Celebrate wins and continue to promote
 - Define training plan for new hires

4.5 Critical Success Areas to Address by Raytheon

Based on key learning points from the three industry case studies, the following list of critical success factors is generated. This section also compares this list of critical success factors to current Raytheon implementation based on interviews with more than 30 people ranging from operators, managers, functional directors, IT directors, program directors, and Raytheon senior leaders from Texas, California, Arizona, and Massachusetts.

Critical Success Factors for SAP ERP Implementations:

- Proactive top-down leadership support
- Thorough system testing simulating production environment with user-generated data
- Hands-on training enabling users to perform end-to-end business processes including non-sunny day scenarios
- Comprehensive metrics to monitor process gaps and progress slips
- Sufficient post-deployment support to rapidly address critical issues

Assessment/Recommendation: Raytheon has strong leadership support for SAP ERP implementation. Although system testing is being conducted, much of the data are not user-generated. In addition, more hands-on training should be provided to ensure end-to-end business processes can be performed. To monitor process gaps, Raytheon is developing a comprehensive set of metrics. At the same time, a post-deployment support group is being established.

Leadership Support

- Leaders and managers advocate SAP usage and mandate all users to prepare for using SAP (e.g. training, share resources)
- Establish linkage between personnel performance evaluation criteria and ERP success

Assessment/Recommendation: Raytheon leadership has been visibly promoting the PRISM system, however, users and managers have varying reactions to PRISM deployment. Most of them are resistant to change and apprehensive about the anticipated performance dip. Recommend proactive leadership support throughout all levels of management and develop performance evaluation criteria to include linkage to PRISM success.

Planning

- Map end-to-end business process changes and gain agreement by users
- Minimize software changes
- Plan for business risks mitigation (e.g. early builds, set up mechanisms to retrieve needed data during initial days of go-live)
- Set up metrics to identify process gaps, user mistakes (e.g. exception messages), and workflow delays
- Support team consist of functional subject matter experts (SMEs) who are star team members

Assessment/Recommendation: All of the above are being planned. However, minimizing software changes will be challenging as various business units have different business needs that may need to be addressed via system changes.

Testing

- Test end-to-end business processes including non-sunny day scenarios
- Test with user-generated data (include as many users as possible) to validate success of 1) user training, 2) system operations, and 3) data conversion

Assessment/Recommendation: A variety of tests have been conducted, however, not as many users were involved in testing the system. Recommend involving more actual users during the testing phase.

Training

- 100% of users obtained hands-on training
- 100% of buyers, planners, and engineers trained in processes and up/down stream effects of transactions
- Users can execute “day in the life” operations in test environment
- Establish forum and mechanism for “shadow learning”, e.g. send team to existing PRISM sites

Assessment/Recommendation: although most of the users are trained, an end-to-end “day in life” test should be conducted prior to go-live. Raytheon should also send as many users as possible to Tucson or Forest sites where PRISM instances were implemented to enable “shadow learning”.

Deployment

- Identify customer commitments for the first 3-6 months (expected performance dip period) and implement mitigation to prevent delays
- Anticipate common mistakes (day 1- login; day 2- create orders; ongoing-exception/error messages)

Assessment/Recommendation: Raytheon is doing well in the above items.

Post Go-Live Support

- Establish 24 hour support mechanism (hyper-care) for 60 days after go live
- Designate decision-making process and authorities (e.g. change control board)
- Establish support structure and processes with sufficient enterprise representation to enable ongoing issue resolution after hyper-care period

Assessment/Recommendation: Hyper-care support mechanism is being established. However, decision-making process and governance structure needs to encompass the new business units being integrated into the PRISM system. Recommend developing governance body, structure, and associated processes with appropriate business and system representation to enable cross-business unit issue resolution.

Metrics

- Reports for performance based on mistakes and corrections
- Reports to assess pre and post deployment productivity and performance
- Customer satisfaction rating
- Comparison between contractual agreements and actual production output
- Track open requisition reports
- Track backlogs
- Track time spent by support team and common issues reported

Assessment/Recommendation: All of the above items are being addressed by Raytheon.

Continuous Improvements

- Track manual steps / work-arounds performed
- Review processes and identify improvement opportunities every 6-12 months
- Set up user groups to exchange information and identify improvement opportunities
- Identify re-training needs
- Establish database to track lessons learned

Assessment/Recommendation: User groups are being set up. A user support group focused on training, continuous improvement, and knowledge sharing is being formed. Recommend user support group integrates with governance structure to ensure new changes and solutions are properly documented and incorporated into standardized processes.

4.6 Recommendation for Mitigating Raytheon Performance Dip

Overall, Raytheon PRISM team has sufficient coverage of risk mitigating activities through the hyper-care period (60 days after deployment). However, post-deployment tasks and processes to enable system adoption and modification to sustain business operations are critical to mitigating the performance dip and accelerating ROI achievement. Also, a user support group for SAS and NCS business units is not formally established.

Examining Raytheon's implementation plan to mitigate the performance dip and accelerate ROI, Raytheon should focus on developing a robust post-deployment governance structure to enable just-in-time decision-making regarding The PRISM system changes and facilitate collaboration among business units and various stakeholder groups to derive at an enterprise SAP solution.

The next chapter examines the current organization structure as well as change management needs for developing an appropriate governance structure to manage PRISM.

5 Organizational Assessment

This chapter analyzes the current organization using stakeholder analysis to view incentives and contribution from each stakeholder. To further explore change management challenges within the organization, the Three-Lens analysis (Ancona 2005, 12-75) method, which is developed at MIT, is used to examine the strategic, organizational, and political aspects of the company. Recommendations to mitigate the performance dip and accelerate ROI are made based on the outcome of each analysis.

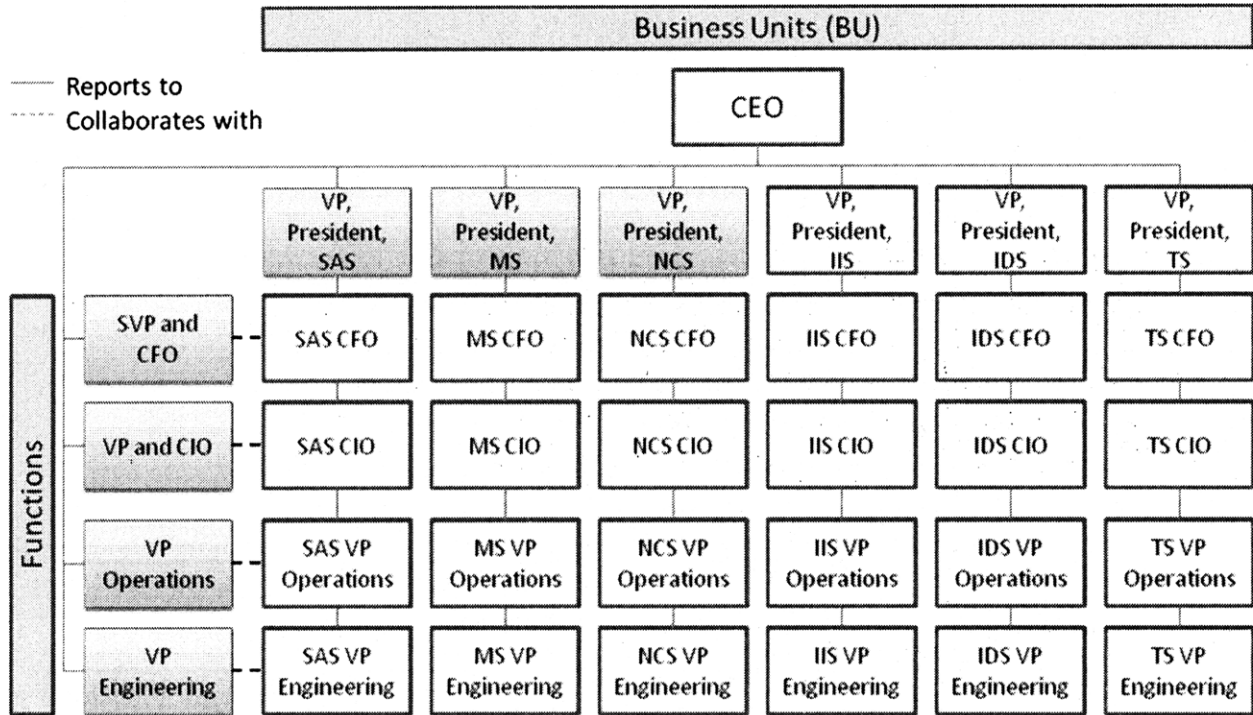
5.1 Organization Structure

Raytheon is a matrix organization grouped by business units and functions. Business unit presidents are responsible for their respective product lines. They are also the corporate vice presidents. The various business units are:

- IDS: Integrated Defense Systems
- IIS: Intelligence and Information Systems
- MS: Missile Systems
- NCS: Network Centric Systems
- TS: Technical Services
- SAS: Space and Airborne Systems

The functional areas include operations, engineering, finance, IT, etc. The function vice presidents and chiefs are responsible for providing corporate-wide support to all business units in their respective functional areas.

Each business unit president also has a management team mirroring that of the corporate president, such as vice president of operations and vice president of engineering. Business unit vice presidents report to the business president and coordinate with their corporate counterparts. Figure 10 illustrates the matrix corporate structure with those involved in SAP ERP implementation highlighted in blue shaded boxes. These corporate senior executives form the Raytheon leadership team.



Business Unit (BU) Acronyms:

SAS: Space and Airborne Systems
 MS: Missile Systems
 NCS: Network Centric Systems

IIS: Intelligence and Information Systems
 IDS: Integrated Defense Systems
 TS: Technical Services

Figure 10. Raytheon corporate organization structure

Further, each business unit also has a matrix structure to align with the defense products contract. To account for cost to develop a defense product, each personnel resource hour used has to be pegged to a specific contract. Therefore, in addition to the personnel with a product program, supporting functional area resources in production control, supply chain, and engineering, etc. need to be associated with a product contract. The functional resources are managed by vice presidents. Directors within each function coordinate between each program, as well as the function vice presidents. Figure 11 below illustrates the organization structure within a business unit.

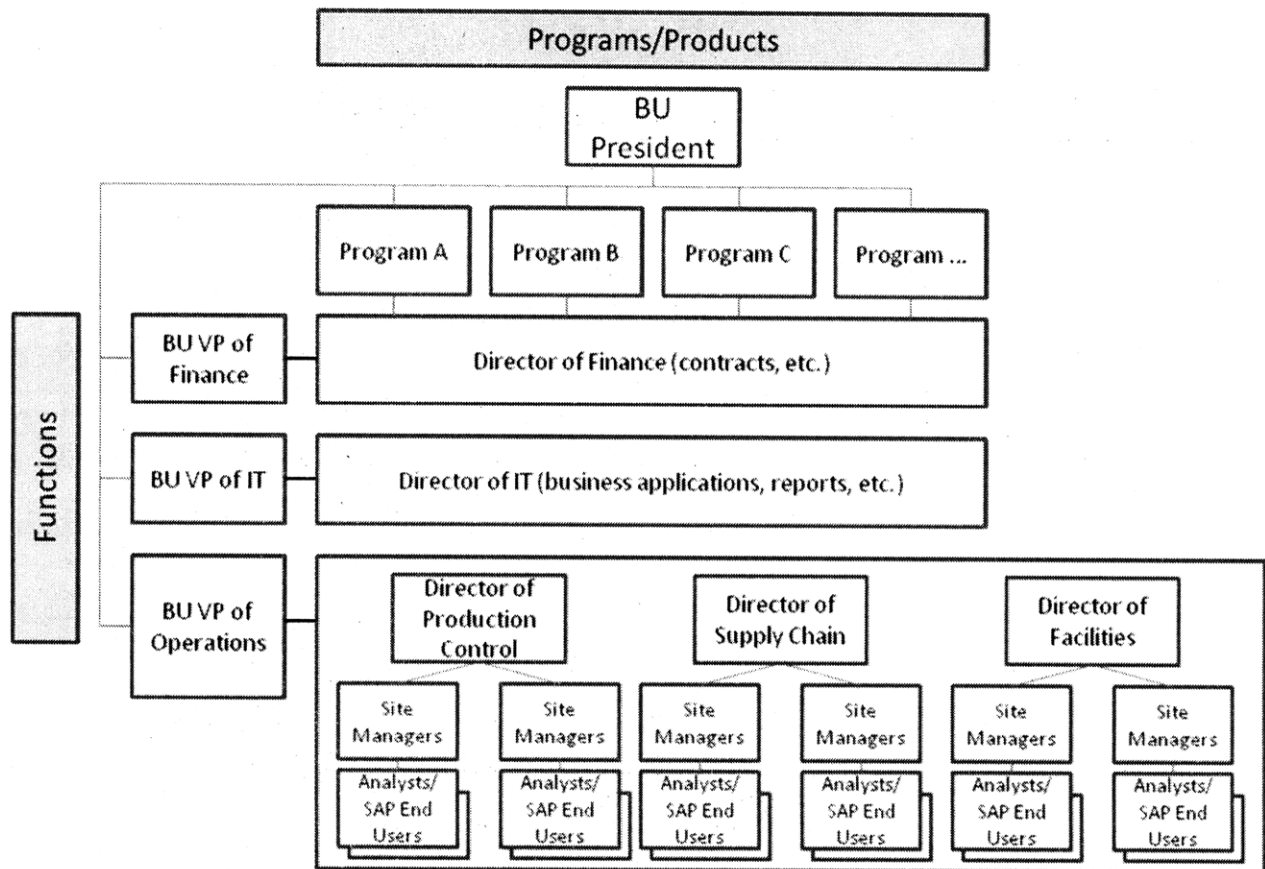


Figure 11. Functional and program organization structure

The PRISM initiative for January 2009 roll-out is sponsored by business units SAS and NCS. The PRISM team works with all members of Raytheon leadership. Members of PRISM are hand-picked “A-players” from various user group functions. PRISM also works closely with the corporate SAP Competency Center responsible for management of the enterprise SAP system. In addition, since Raytheon MS (RMS) business unit implemented PRISM first, a RMS user support group was established, reporting to the MS VP of operations. Figure 12 below is an illustration of the reporting relationships with respect to PRISM implementation.

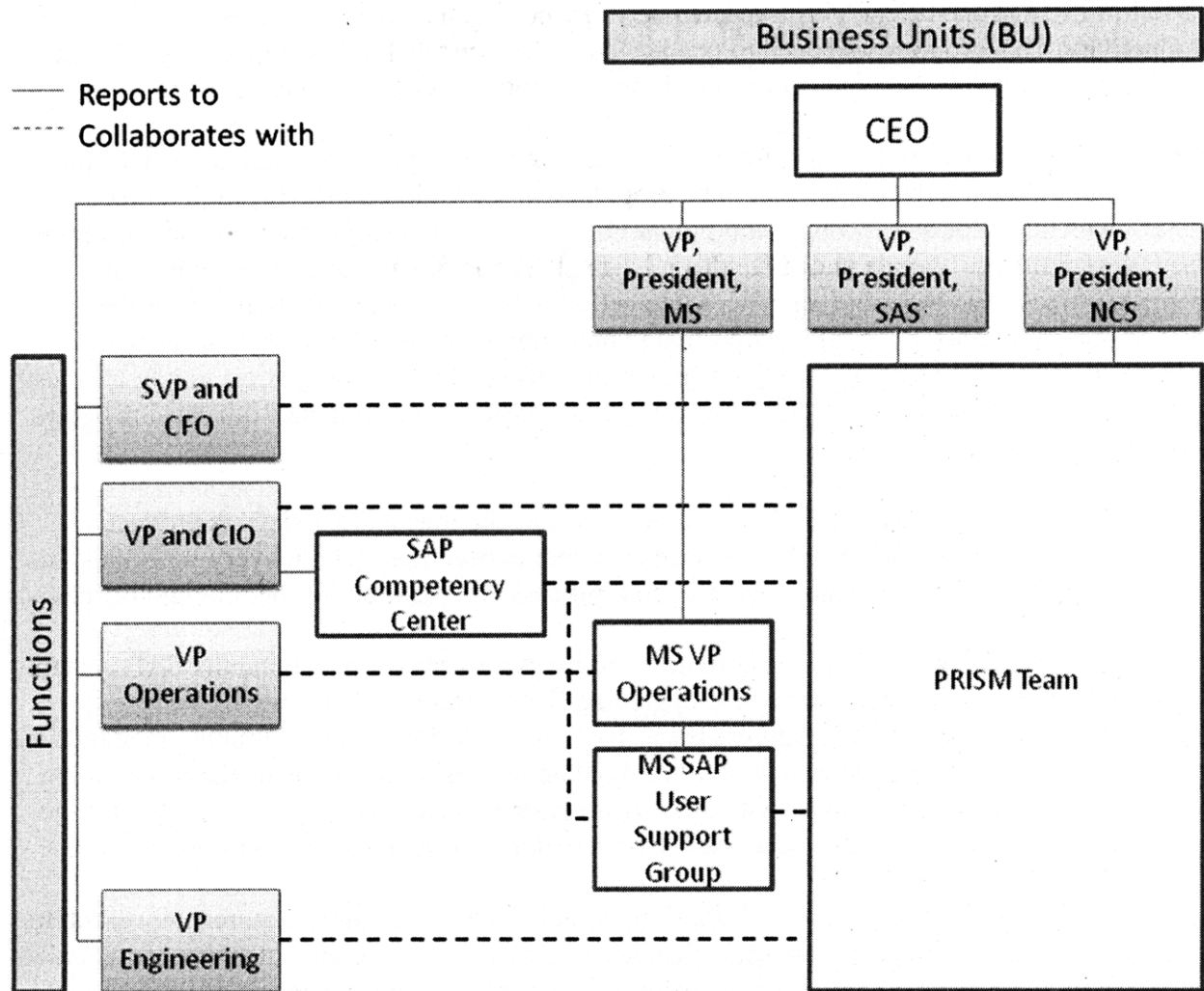


Figure 12. Linkage structure among stakeholders

5.2 Stakeholder Analysis

The stakeholder analysis examines the objectives, priorities, and interrelationships among all the stakeholders of the PRISM program. The stakeholders of this project are as follows:

Raytheon Leadership: The leadership members are vice presidents of Raytheon and its business units. This stakeholder group drives the corporate strategy and vision to be realized by the PRISM program. The leadership team demonstrates commitment to PRISM success to program offices and function directors. They also broadcast Raytheon’s commitment to achieve its “one company” vision via newsletters, websites, and emails to the entire company. The leadership team provides resources for the SAP Competency Center and the PRISM Team. This team fully supports PRISM implementation.

Impact of PRISM on stakeholder: Expected performance dip may decrease revenue and productivity. This group would need to manage customer and stockholder expectations. In the long-run, PRISM would enable better overall process optimization for the enterprise.

Raytheon Program Offices: This group represents Raytheon's product programs such as the radar program, the space program, etc. The program offices work with Raytheon functional groups, which include supply chain and production control to deliver products to end customers. The program offices operate under Raytheon leadership. The functional groups support the program offices. And the program offices interact directly with customers. Support for the PRISM program varies from fully supportive to non-supportive. Some program officers are supportive due to the expected benefits of program transparency and integration among business units. However, some program offices are wary of the expected performance dip causing delays to meet customer commitments.

Impact of PRISM on stakeholder: Expected performance dip may cause delays in product shipments. This group would need to manage customer expectations and delivery schedules. In the long-run, PRISM would enable better overall process optimization for the program offices.

SAP Competency Center: This is a corporate group responsible for managing the SAP system. The competency center functions include upgrading SAP system, update system, manage requests for SAP improvements, address break-fix issues, develop technical training materials, etc. The competency center coordinates with Raytheon leadership to ensure its operations align with corporate objectives. It works with the PRISM team to develop the system suitable for the user population. The center also addresses issues escalated through user support organizations.

Impact of PRISM on stakeholder: The additional users and business units requires this group to plan for increased workload and manage change requests among different enterprise stakeholders while maintaining the one-company SAP solution. This group is in full support of PRISM deployment.

PRISM Team: This is the core team driving all PRISM planning, implementation and deployment activities until 2 months post-deployment. The team has cross-functional representation for all impacted business units (SAS and NCS). This team works under the sponsorship of Raytheon Leadership and collaborates with program offices and function directors (e.g. supply chain) to ensure business processes are in alignment with the PRISM system. The team develops and staffs the user support organizations to ensure successful adoption of the system by end users.

Impact of PRISM on stakeholder: This team was created in order to implement The PRISM system. The success of the team is dependent on minimized performance dip post-deployment. This group is in full support of PRISM deployment.

Function Directors: This stakeholder group includes directors from production control, supply chain and factory management. They support the activities of the PRISM team to ensure daily

tasks within the functional groups can be successfully executed using the PRISM system. This group also directly supports program offices in product builds. The personnel in these groups will be the users of the PRISM system. The group operates under Raytheon leadership team. This team fully supports PRISM implementation and has been involved through the implementation phases.

Impact of PRISM on stakeholder: PRISM enables the business process of their respective functions. The success of their role depends on how well their users can use PRISM to perform functional tasks such as ordering materials, assembling build kits, and delivering to customers. In the long-run, PRISM would enable better overall process optimization for their functions. This group fully supports PRISM deployment.

End Users: This stakeholder group consists of personnel from functional groups. The PRISM Team manages user communications and training. The end users perform functions to support program offices such as ordering materials and preparing for build kits. All the users are staff members of the function directors. Users are mandated to adopt and use the system.

Impact of PRISM on stakeholder: The users will use PRISM for a majority of their work tasks. The success of the end user group depends on how well they can use PRISM to perform their job tasks. In the long-run, PRISM would enable better overall process optimization for the users. User support for the program ranges between supportive to non-supportive. Some users oppose PRISM implementation due to the expected performance dip and changes to business processes.

User Support Group: This group consists of members who are power users, subject matter experts, and technical experts of the PRISM system, as well as members from the PRISM team. This group works closely with users to ensure system adoption and problem resolution. The user support organization will collaborate with the SAP competency center to ensure user issue resolution. This team fully supports PRISM implementation.

Impact of PRISM on stakeholder: This group is established in order to assist end-users in adoption PRISM. The success of this group is dependent on minimized performance dip post-deployment. PRISM users are expected to adopt the system thus requiring decreasing support from the group overtime. This group is in full support of PRISM deployment.

Figure 13 below illustrates relationships among the stakeholders. Each line indicates a direct working relationship between the stakeholder groups. Plus and minus signs indicate whether the stakeholder is in support of PRISM. The diagram highlights that Raytheon Program Offices and end users have varying levels of support towards PRISM. Negative support from program offices may affect full system adoption and delay ROI as program offices can leverage transparency of program progress based on material flow, inventory, schedule, and financial information. To mitigate the risk of slow adoption by program offices, the PRISM team has established a business readiness group (BRG) to facilitate system adoption by program offices. As for the users, similarly, negative support for the system delays ROI of the system. Particularly, mistakes made by users may have significant downstream impacts on production output and quality. To

facilitate user adoption, the PRISM team has established business power user (BPU) groups who are selected from functional groups to train users within their own function in using the system.

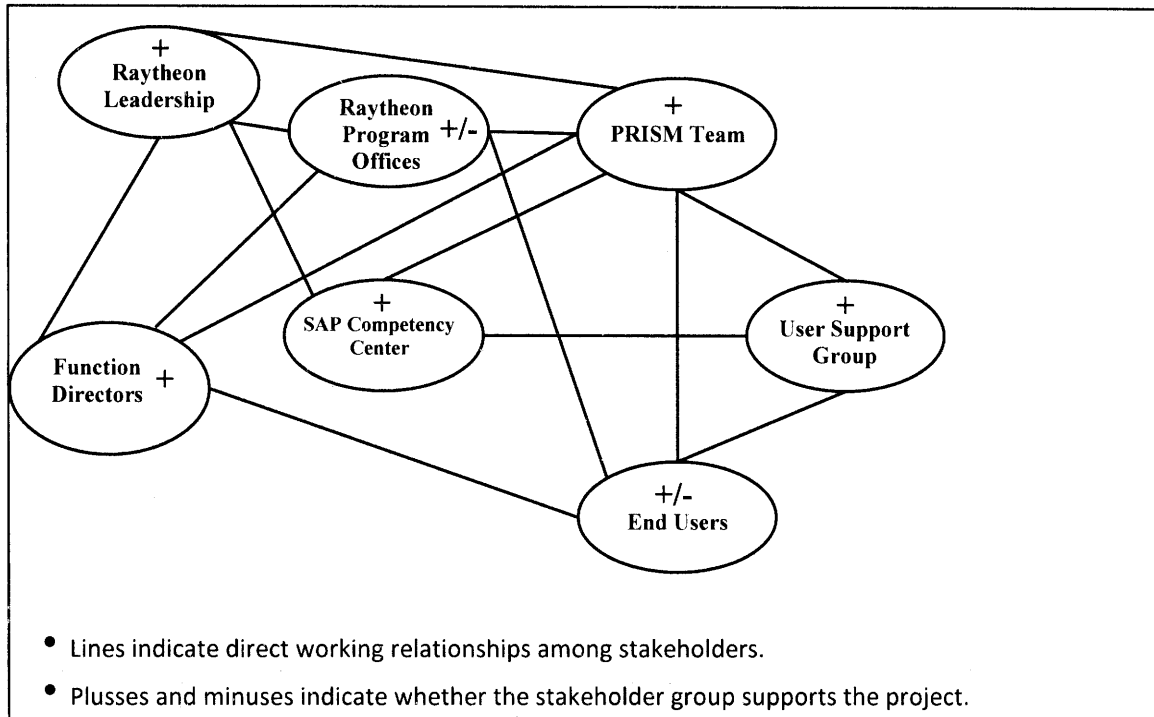


Figure 13. Stakeholder Relationships

5.2.1 Value Exchange between Stakeholders

Value exchange indicates the exchange of value contributed to the enterprise by the stakeholder and value gained by the stakeholder from the enterprise. The value exchanged between stakeholders and the enterprise is listed in the Stakeholder Value Exchange Table 2 below.

Stakeholder	Value Expected from the Enterprise	Value Contributed to the Enterprise
1. Raytheon Leadership (C-level executives from corporate and business units)	<ul style="list-style-type: none"> • Enterprise solution • Cheaper, faster, better products • Transparency across sites 	<ul style="list-style-type: none"> • Funding for program • Leadership endorsement of program • Personnel resources
2. Raytheon Program Offices (Product development organizations, e.g. radar program)	<ul style="list-style-type: none"> • Operational visibility (e.g. material delivery) • Cost-savings in inventory and materials • Resources to meet customer commitments 	<ul style="list-style-type: none"> • Commitment to utilize and interface with PRISM enterprise system • Communications to program staff • Feedback to improve system
3. SAP Competency Center (Enterprise SAP management center)	<ul style="list-style-type: none"> • Resources for managing and developing SAP system • Career growth opportunities • Decision-making authority 	<ul style="list-style-type: none"> • Integrated SAP enterprise system • Updates/improvements to SAP • Technical user support
4. PRISM Team (Implementation and deployment project team)	<ul style="list-style-type: none"> • Budget for planning and implementation • Leadership direction and sponsorship • Career growth opportunities 	<ul style="list-style-type: none"> • Streamed lined enterprise business solution • Training to users • Roll-out execution • Continuous improvement
5. User Support Organizations (Teams established to aid users in system adoption)	<ul style="list-style-type: none"> • Resources for supporting user groups • Leadership direction and sponsorship • Career growth opportunities 	<ul style="list-style-type: none"> • Timely resolution of user issues • Status reporting enabling corrective actions/improvements • Benefits/ROI documentation
6. Functional Directors (e.g. production control, supply-chain management)	<ul style="list-style-type: none"> • Cross-functional reporting • Empowered staff • Resources 	<ul style="list-style-type: none"> • Committed staff to use system for business operations • Communication of changes • Feedback to improve system
7. End Users (Function area staff performing PRISM transactions)	<ul style="list-style-type: none"> • Transparency of data across processes • Training for new system • Simplified processes 	<ul style="list-style-type: none"> • Input data to operate enterprise solution • Business process knowledge • Cooperation and compliance to new processes

Table 2. Stakeholder Value Exchange

5.2.2 Stakeholder Performance Analysis

Stakeholder performance derived from EVSMA 1.0 (Nightingale and Stanke 2005) developed by MIT's Lean Advancement Initiative is a graphical representation of a value delivery assessment from the stakeholder's perspective. The x-axis is the relative importance of a value, e.g. career growth, to the stakeholder. The y-axis is the relative performance of actual delivered value to the stakeholder.

The results of the performance analysis are collected from company documents and interviews with more than 30 people from Raytheon ranging from users, SAP consultants, functional team managers, functional directors, Raytheon leadership team members, and PRISM Enterprise Team members in Texas, Mississippi, and California.

An overall rating for value delivery is calculated as such: green box – 3 points, orange box – 2 points, red box – 1 point. The higher the point value, the better Raytheon is meeting the expectation of the stakeholders. Figure 14 thru 20 shows the value exchange for each of the stakeholders.

Value Delivery: PRISM Team (6 points)

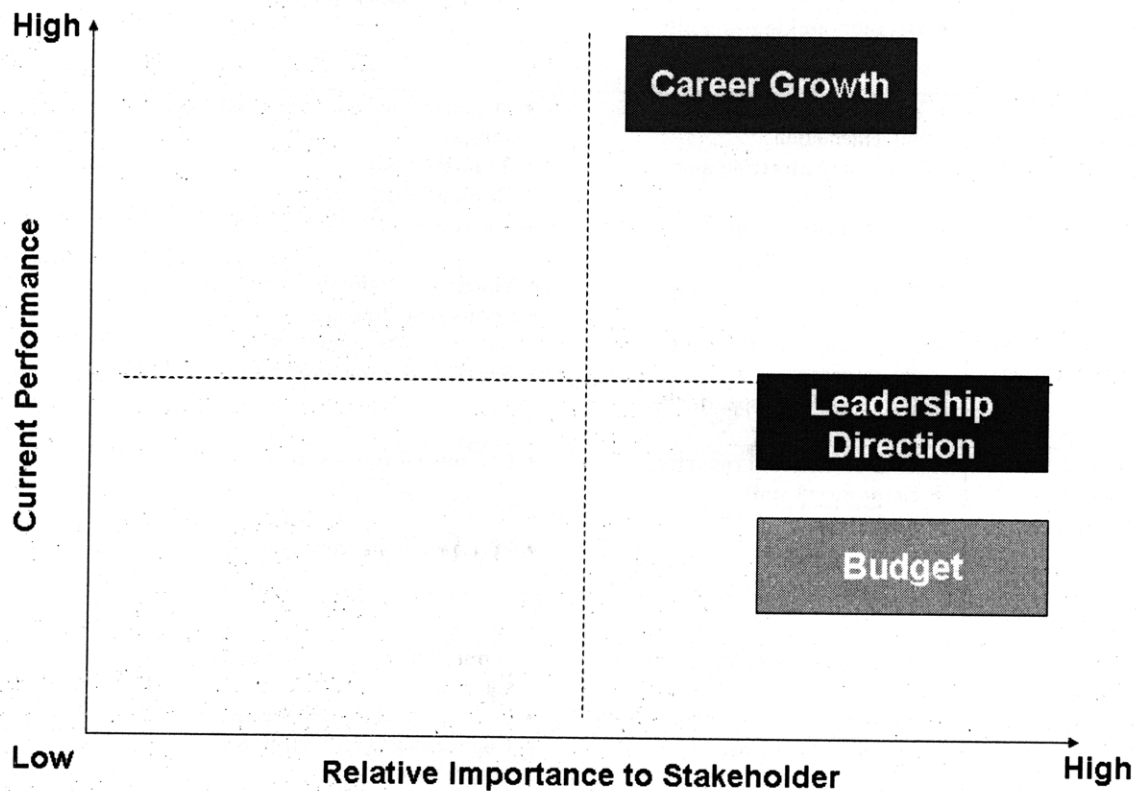


Figure 14. Value Delivery to PRISM Team

Career growth: most members of the PRISM team are deemed as outstanding performers in their pre-PRISM business unit roles. Being involved with PRISM implementation provides team members with unparalleled learning and knowledge necessary for Raytheon organization.

Leadership direction: The PRISM program was initiated by the SAS VP of Operations, who then was promoted to become corporate VP of Operations. An executive steering committee with membership composed of vice presidents of Raytheon and business unit vice presidents was established. Some members of the steering committee were more proactive than others in showing their support for PRISM objectives.

Budget: program budget was allocated for an April 2008 deployment. However, due to a near eight-month delay in PRISM deployment, many team members were de-staffed in order to sustain the organization on a limited budget. Proposal for budget increase was partially awarded. As a result, readiness preparation tasks such as training were scaled back.

Value Delivery: Raytheon Leadership (4 points)

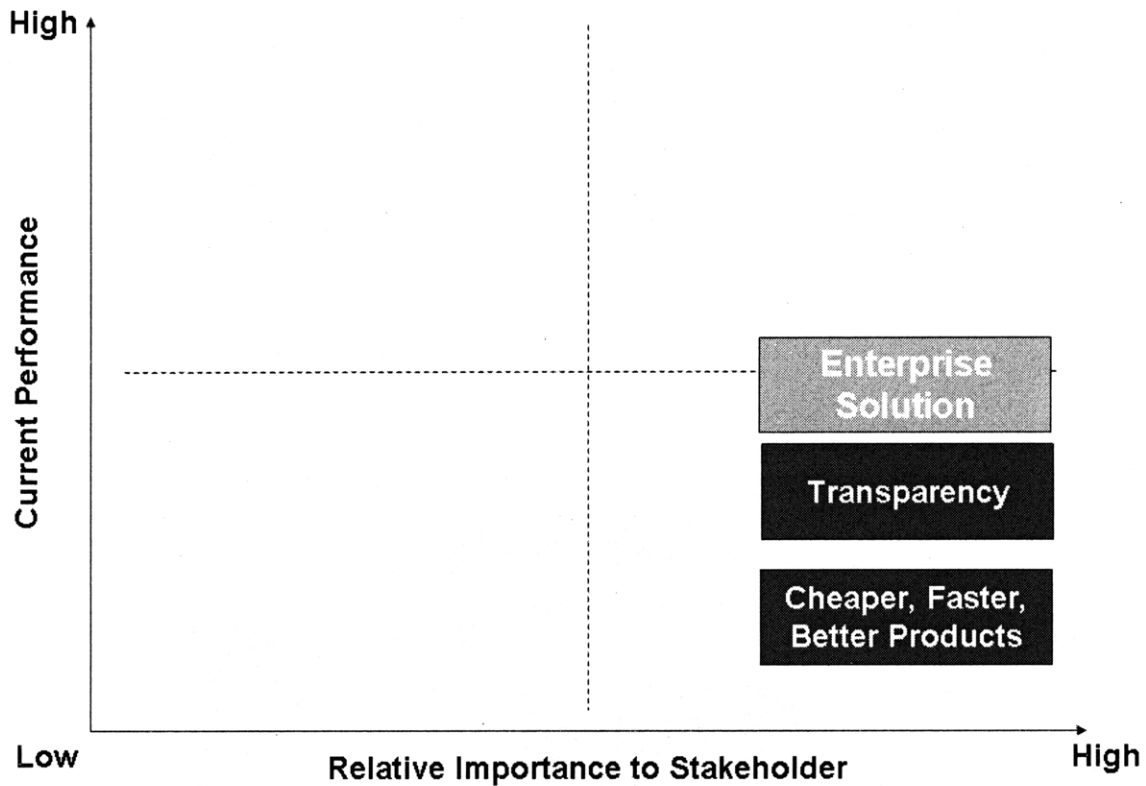


Figure 15. Value Delivery to Raytheon Leadership

Enterprise solution: As there are multiple business units, and each has requested particular SAP customizations to enable their business processes, the achievement of enterprise solution is in-progress. Over time, as a strong SAP governance body with specific objective of achieving one enterprise system, the single enterprise solution may be achieved.

Transparency: As business unit users begin to adopt PRISM, transparency among business operations can be achieved. However, in the near future, transparency is a work-in-progress until all business units have sufficient knowledge of the PRISM system as well as how business units can work with each other and integrate their data to achieve transparency.

Cheaper, faster, better products: As performance dips are anticipated, cheaper faster, and better products may be possible when transparency and integration among business units are achieved. In the near future, Raytheon will spend its resources on adopting and learning how to best leverage the PRISM system. Within one to two years, Raytheon may see significant savings in operations.

Value Delivery: End Users (3 points)

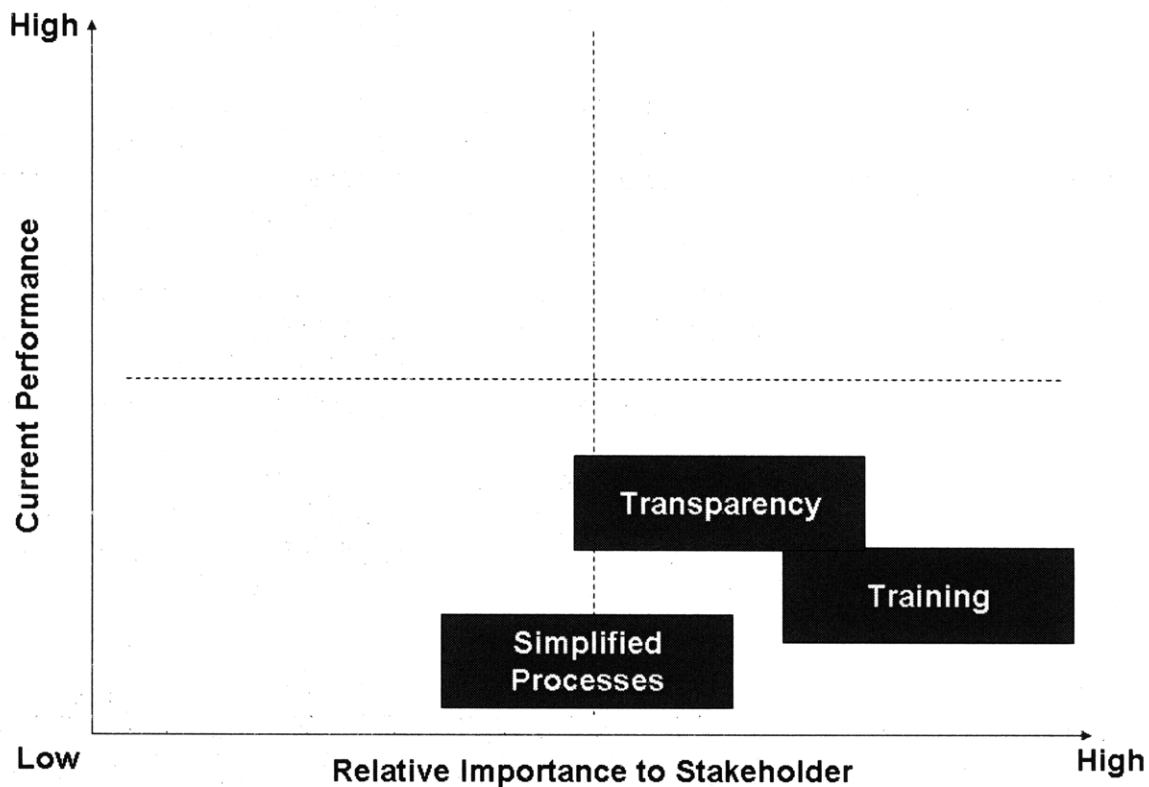


Figure 16. Value Delivery to End Users

Transparency: As users begin to adopt PRISM, transparency among business operations can be achieved. However, in the near future, transparency is a work-in-progress until all users have sufficient knowledge of the PRISM system as well as how business units can work with each other and integrate their data to achieve transparency.

Training: Due to budget limitations, time for users to use PRISM hands-on was limited. Compared to companies where users have familiarity with the system months prior to PRISM deployment, Raytheon users have basic understanding of the system. However, business power users (BPUs) are fully familiar with system usage and sufficient numbers of BPUs are allocated to support users post-deployment.

Simplified processes: Due to pre-packaged nature of PRISM, many process steps changed for operational tasks. Some of these changes involve more steps to perform an operational task. Some involve fewer steps. In the immediate future, the processes would not be perceived as simplified until there is extended use of the system.

Value Delivery: SAP Competency Center (8 points)

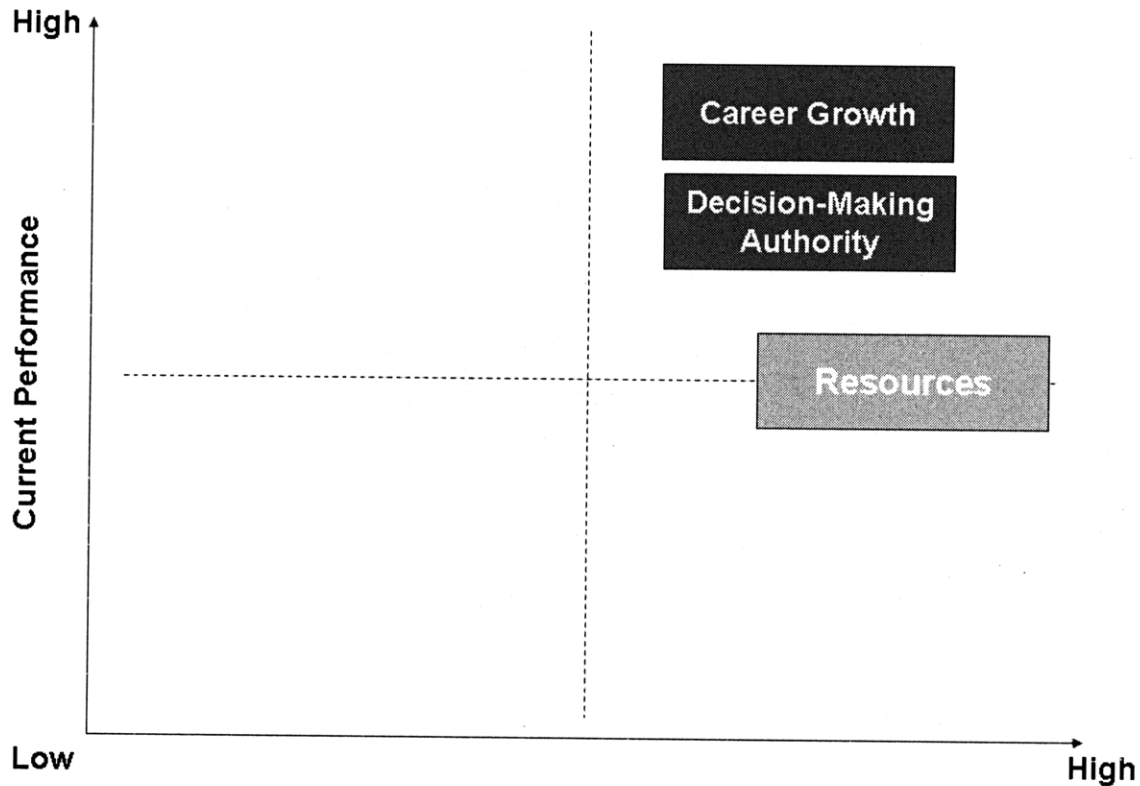


Figure 17. Value Delivery to SAP Competency Center - Operations

Career growth: With the addition of SAP users, members of the SAP competency center will be ever more critical to the success of Raytheon. Therefore, career growth opportunities are abundant.

Decision-making authority: As the corporate organization managing and maintaining PRISM, the SAP competency center has sufficient authority on technical aspects of the system.

Resources: With an increase in business unit users, the amount of resources for user support and issue resolution may be insufficient to resolve PRISM problems in a timely fashion. However, resources from additional PRISM support organizations, which are sponsored by business units, would add to resources available to support PRISM.

Value Delivery: Raytheon Program Offices (6 points)

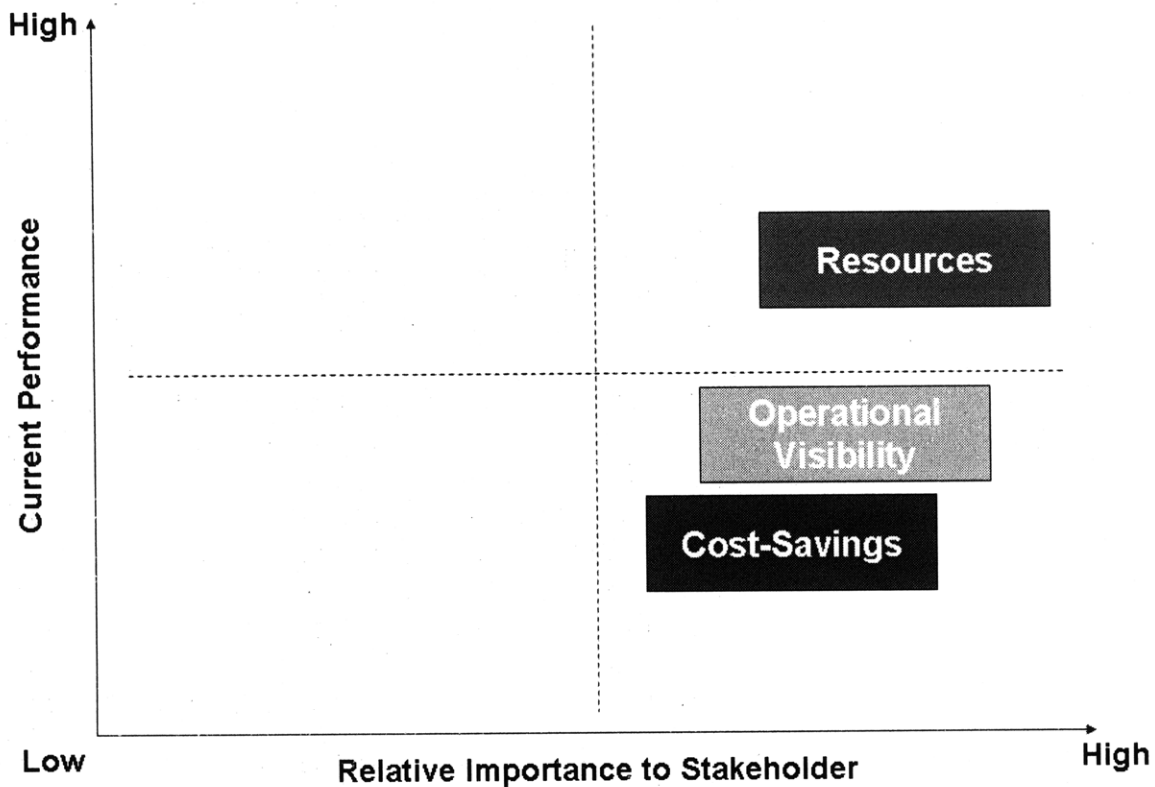


Figure 18. Value Delivery to Raytheon Program Offices

Resources: The primary objective of program offices is to meet customer commitments for product delivery and services. The PRISM program's objective is also to ensure customer

commitments are met. Mitigation tasks to ensure customer commitments can be met during the period of anticipated performance dip have been planned and executed accordingly.

Operational visibility: Currently, visibility of program tasks across different business units and sites is not fully integrated. However, once the PRISM system is fully adopted, operational visibility would be achievable.

Cost-savings: cost-savings in materials, inventory, and labor costs may be realized after the PRISM system is fully adopted.

Value Delivery: Function Directors (6 points)

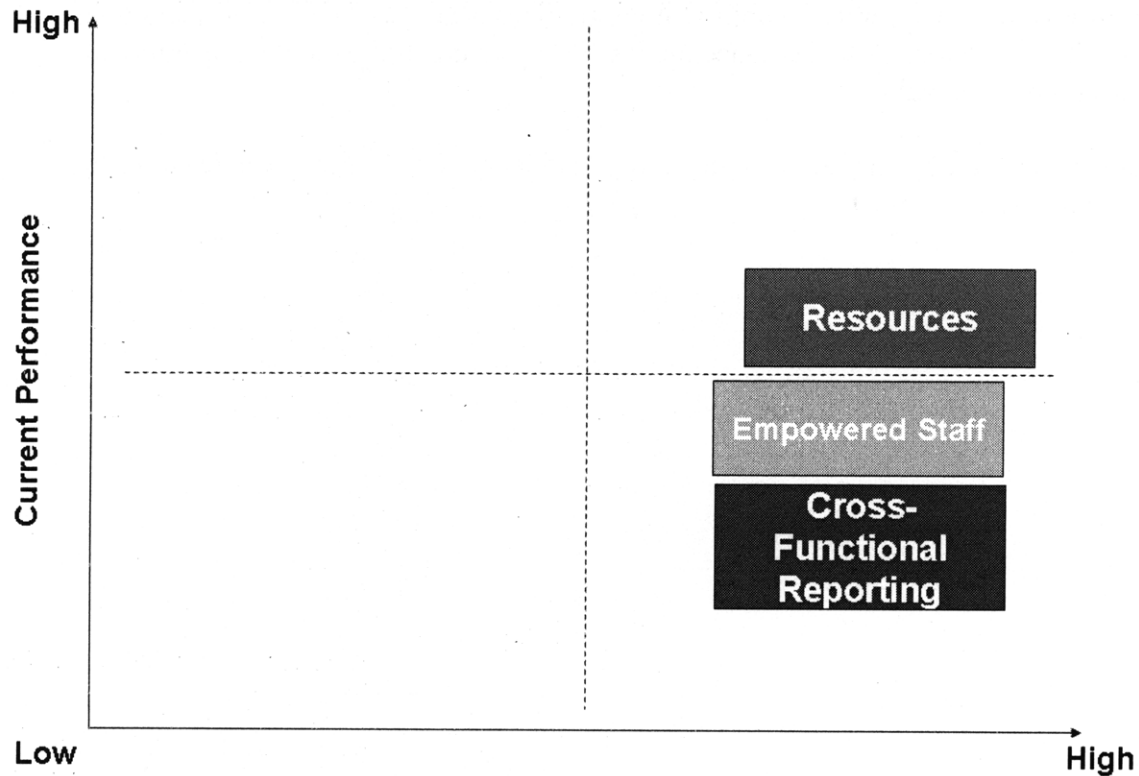


Figure 19. Value Delivery to Function Directors

Resources: Function directors have nearly sufficient resources in budget and personnel to prepare for PRISM deployment. However, more resources would enhance the preparedness of each business function.

Empowered staff: With the impending deployment of PRISM, staff members seem apprehensive about the new system. However, all staff members would have received training on performing PRISM transactions. But simulated test environments are limited in scope to enable users to perform PRISM tasks end-to-end.

Cross-functional reporting: Currently, reporting across functions (e.g. between production control and supply chain) is disintegrated. Having cross-function reporting capability enables function directors to manage supply-chain readiness for production.

Value Delivery: User Support Organizations (6 points)

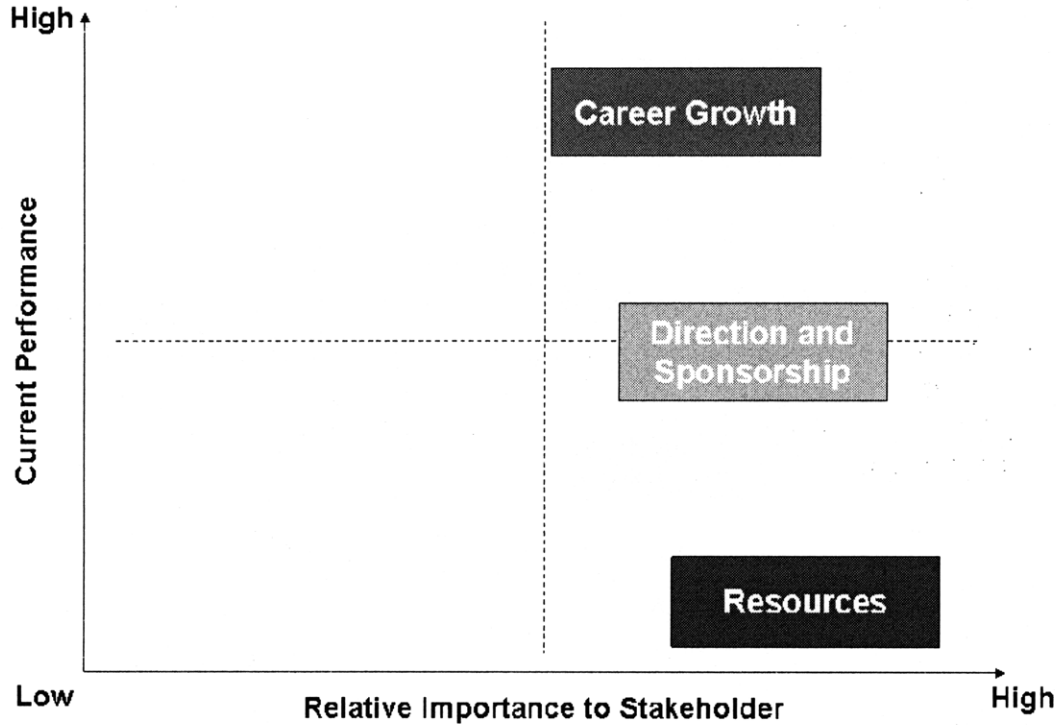


Figure 20. Value Delivery to User Support Organizations

Career growth: With PRISM as the corporate enterprise vision of “one company”, members of the user support group will continue to be valuable employees to Raytheon, and therefore can expect ongoing career growth.

Direction and sponsorship: support organizations are funded by business units with specific objectives of supporting users and ultimately enhancing operational performance. The RMS support organization has been functioning for over a year. However, the CalTex support organization is being planned, and the full reporting and sponsorship details are not finalized.

Resources: Funding and personnel resources to implement and sustain support organizations are being planned. However, resources for CalTex support organization are being proposed, but not funded yet.

5.2.3 Stakeholder Value Comparison

Stakeholder value comparison represents graphically how well stakeholders’ expectations are met by the enterprise relative to each other. This analysis highlights stakeholders where additional attention is required to better address stakeholder needs. Figure 21 shows value comparison among the stakeholders.

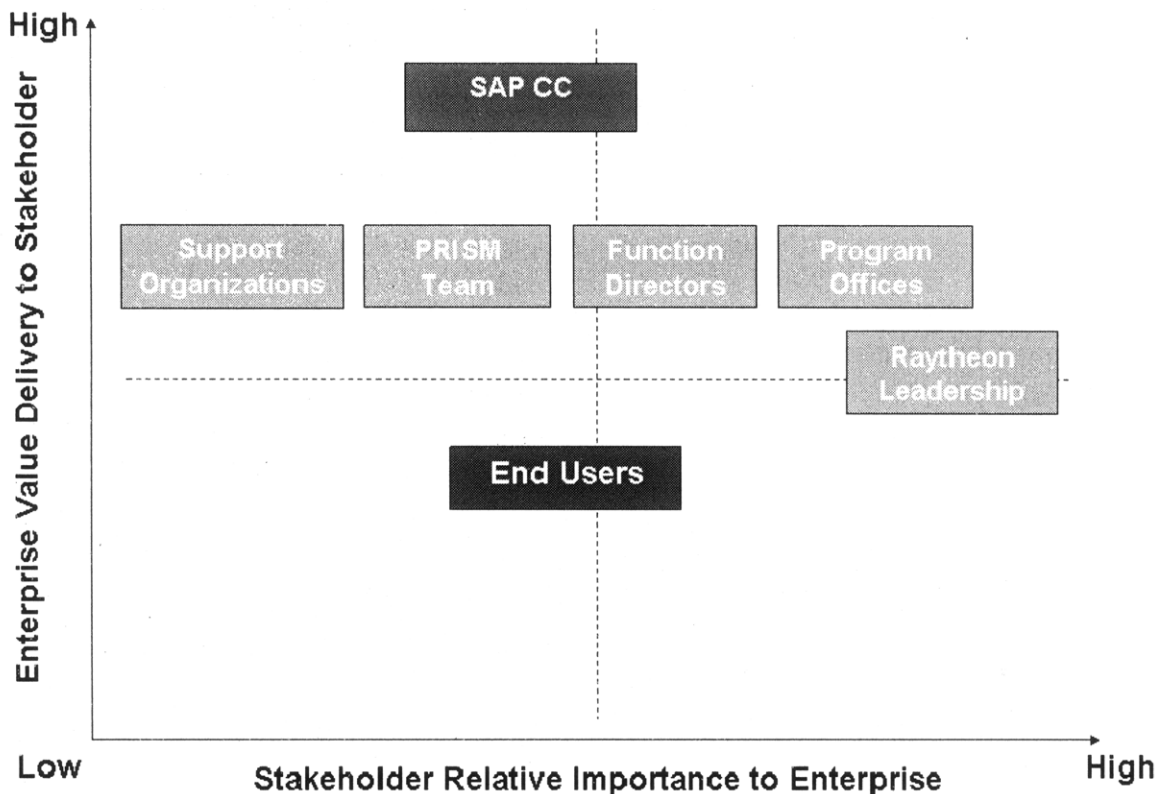


Figure 21. Stakeholder Value Comparison

The value comparison chart indicates that while the SAP competency center receives most of its expected values, the end users' expected values (transparency, training, simplified processes) are not met adequately. Users are critical to the operational processes, therefore mitigation plans need to be deployed to better address user needs.

Additionally, the chart highlights that Raytheon leadership expectations (transparency, cheaper, faster, better products, and enterprise solution) cannot be met adequately in the near future. However, as time progress and users begin to adopt PRISM usage, continuous process improvements and cost-savings are expected.

5.2.4 Recommendations

The following recommendations are based on stakeholder analysis from prior sections. Recommendations are aimed at each stakeholder group to mitigate the PRISM performance dip and accelerate ROI.

SAP CC: Ensure sufficient resources are allocated to manage PRISM ongoing.

Support Organizations: Ensure sufficient resources and sponsorship is provided to implement the support organizations which are critical to user support.

PRISM Team: As the PRISM team will disband after the two-month performance support period (March 2009), knowledge transfer mechanisms should be established to ensure continuity of process and technical knowledge of the system. In addition, where appropriate, members of the PRISM team should be allocated to the SAP competency center, and/or support organizations to further mitigate the performance dip and facilitate acceleration of PRISM ROI.

Function Directors: Post PRISM deployment, functional directors need to keep close watch of business performance and provide user support and management guidance when needed to mitigate the performance dips.

Program Offices: program offices need to stay in close communications with functional areas to ensure adequate coordination of material readiness necessary to meet customer commitments.

Raytheon Leadership: the leadership team should provide resources and sponsorship as needed to support performance dip mitigation activities in order to expedite achievement of PRISM objectives.

End Users: users need to proactively seek help and identify errors as well as improvement opportunities as they interact with PRISM. Users should also keep close documentation of activities performed via PRISM and provide input to resolve PRISM issues.

5.3 Three-Lens Analysis

Throughout Raytheon's history, it has encountered numerous mergers and acquisitions creating different organization structures, political environments, and cultures that are relevant in managing the successful deployment of an enterprise system that will change daily tasks for more than 7,000 people. The Three-Lens analysis views the company from strategic, political, and cultural perspectives to identify resistance and leverage areas in the organization in order to affect change with respect to PRISM implementation.

5.3.1 Strategic Analysis

This analysis examines the strategic objectives, organization structure, decision-making process, communication mechanisms, and team capability aspects that would affect successful PRISM implementation.

Strategic Objectives

Raytheon Space and Airborne Systems (SAS) operates three major manufacturing sites, which produce a diverse range of defense products worth over \$2B annually using a wide range of disconnected non-integrated business systems and tools. SAS's strategy to improve organization performance is through the corporate vision of "one company", by implementing PRISM. My project is to ensure the successful deployment of PRISM by mitigating the anticipated performance dip post-deployment and accelerate ROI.

PRISM affects end-to-end production chain from ordering materials, buying materials, to shipping materials. PRISM integrates all the data, records, and processes of production. The

system is expected to save the company millions of dollars per year from materials, labor, and productivity improvements. However, it will affect the daily activities of about 7000 users involved in the end-to-end process across California and Texas sites. In order to fully integrate PRISM effectively and replace existing systems, all the users need to be trained. Also, various sites and business units are not used to working together or seeing each other's data. Further, each site has different product lines, and therefore unique production processes.

The macro challenges include:

- Altering PRISM and business processes to create an enterprise The PRISM system with standardized features, operating procedures, and reports
- Integrating business processes among various sites and business units
- Developing mechanisms for various sites to agree on PRISM changes and collaborate on operational activities

On the micro-level, the challenges include:

- Identifying the appropriate functional subject experts to help functional team members learn to use PRISM
- Training users
- Supporting users after PRISM go-live
- Addressing business or system gaps after go-live to ensure production continuity

Organization Structure

The PRISM program Office was established to implement the PRISM system by interfacing with the SAS business unit to determine business process requirements and the SAP competency center (CC), which is the corporate center for technical implementation of SAP. SAP CC approves code changes to The PRISM system, tests changes made, and maintains The PRISM systems at all sites.

The current design with The PRISM program Office as the liaison between SAP CC and business units facilitates the integration of PRISM into operational activities. The PRISM program Office membership can be divided into three sub-groups: Value-Stream Integration Teams, Process Compliance Teams, and Value Stream Delivery Teams. In the Value-Stream Integration Team, functional leads from finance, plan, source, make, deliver, depot, and facilities serve as subject matter experts in developing the PRISM system for their respective functional areas. The team leads work with sites and business units to ensure PRISM can execute those functions, identify training needs, and communicate with the business units on PRISM changes related to those functional areas. Process compliance team is responsible for ensuring PRISM

Figure 22 below is the organization chart for the PRISM team.

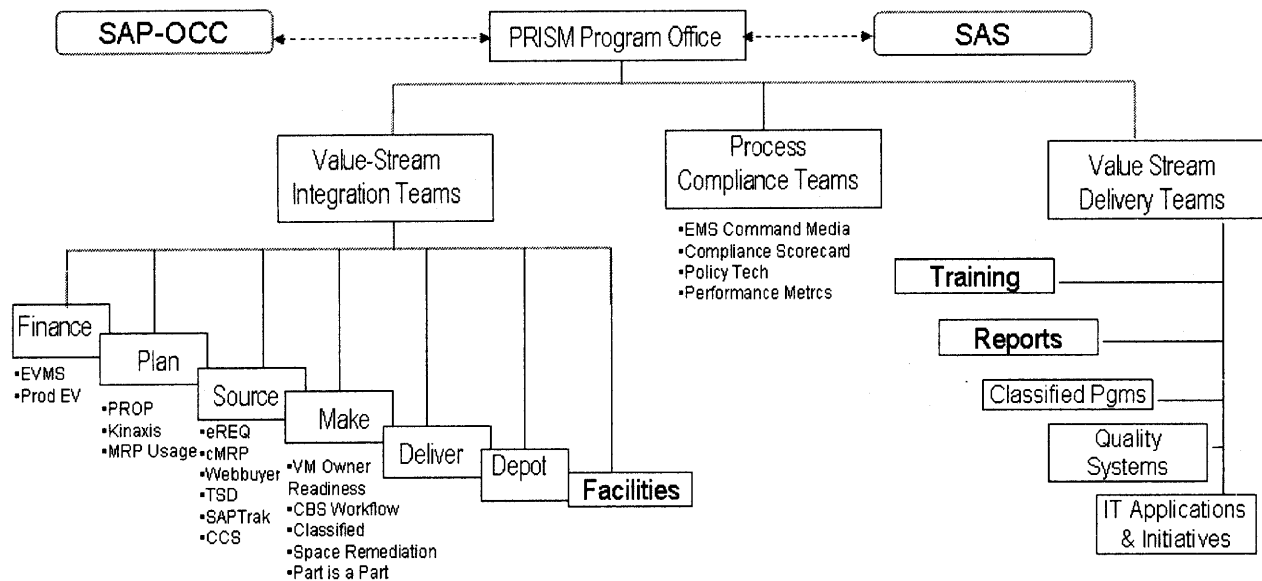


Figure 22. The PRISM program office organization

The PRISM program office works with SAP Competency Center - Operations to implement the system based on requirements from the SAS business unit. The PRISM team is divided into three sub-teams, the Value-Stream Integration Teams, Process Compliance Teams, and Value Stream Delivery Teams. The Value-Stream Integration Teams consists of different functional groups within the business unit, which are finance, plan, source, make, deliver, depot, and facilities. The Process Compliance Teams ensure compliance with policies and manage performance metrics. The Value Stream Delivery Teams provide training, reports, and interface to classified programs, quality systems and other IT applications.

Resource Allocation

Resources for PRISM are “borrowed” from organizational groups. For example, in Production Control, top-performing team leads were identified and “lent” to the PRISM team to serve as subject matter experts to ensure PRISM functions sufficiently support functional production activities. PRISM business system experts (BSEs) are expected to move to the SAP Competency Center – Operations after PRISM go-live to continue their roles in supporting PRISM for their respective organizations. However, the post go-live user support group for SAS/NCS took some time to get funded. This makes the project challenging as it is hard to identify with whom to work in order to establish an efficient and effective post-deployment support organization prior to funding is secured.

Interrelationships

The PRISM team serves as the coordinating system to ensure successful PRISM implementation. However, since PRISM go-live was delayed by eight months, more funding is needed to sustain

the coordinating group. About 80 people from the team were reassigned to trim costs of sustaining the group since the March 08 go-live date was postponed.

Recommendation

A governance body is needed to make decisions on enterprise solutions and agreements. In addition, a team of functional experts from each area needs to be identified to ensure PRISM support after go-live.

5.3.2 Political Analysis

This analysis examines the political aspects, including stakeholder interest, decision powers, and conflict resolution mechanisms, that would affect successful PRISM implementation.

Stakeholder Interests

Generally, the interests of the various stakeholders are compatible- everyone wants cheaper production activities, and more productive labor force. However, in order for PRISM to become successful, training time needs to be allotted and additional resources need to be assigned to support PRISM. However, as mentioned earlier, the program offices are taking a passive role in supporting PRISM, meaning, they are not providing additional funds or people to support PRISM. Therefore, program office leads need to be convinced to take a more proactive role, e.g. identify their subject matter experts and provide resources to support PRISM.

Decision Powers

The functional teams have power in that they are the users of the system. They provide input on how the system should work and ensure the functional team members are trained. The management team has power because they control the resources in terms of personnel and funding for the PRISM program. And PRISM team has power as they are the central coordinating body that ultimately decides PRISM functionality and associated training. After PRISM goes live in January, the PRISM team will be regrouped under an enterprise organization that continues support of PRISM and enables its continuous improvement.

The different parties, SAP competency center, The PRISM program office, functional groups, and product program offices, do not typically collaborate together. However, the PRISM team has been working over the past few years to establish relationships with each of the parties to enable cross-team collaboration and problem resolution.

Conflicts

The project encountered a few challenges. For example, the go-live date has been delayed twice, once due to technical issues that must be addressed, and another time due to potential risk to financial reports. The go-live date was finally resolved through the executive steering committee with representation of vice presidents from various functional areas (operations, supply-chain, IT, manufacturing, and Head of SAP competency center, etc.). The executive steering committee made a decision on a go-live date after reviewing business analysis of various proposed go-live dates.

Recommendations

The less powerful parties are the functional and program office users. It is important to establish a mechanism to enable users to provide feedback and request for help with PRISM. Also, the PRISM program Office sometimes struggles to have their recommendations implemented due to resource constraints. Product program offices should be engaged to support PRISM and provide necessary resources in funding and personnel to support PRISM.

5.3.3 Cultural Analysis

This analysis examines the cultural aspects that would affect successful PRISM implementation.

Raytheon is a merger of various companies. From the cultural perspective, there are three major cultures, one of Texas Instruments (TI), the other of Hughes Aircraft, and a third of legacy Raytheon. TI's cultural has a process focus, while Hughes' culture has an entrepreneurial focus. In contrast, legacy Raytheon has a command and control culture. The TI cultural is pervasive through the Texas site, the Hughes' culture is pervasive through California sites, and legacy Raytheon culture is seen on the east coast sites. Raytheon hallways where the two cultures reside are decorated with product models and production metrics. People are proud of the products.

Challenges Expected

The PRISM system will particularly challenge the assumptions of the organization as it will validate assumptions to business processes and uncover many legacy operations that were not standardized and may not be value-added to the business. PRISM will reinforce the process focus, which may be more challenging for the California site to get onboard with PRISM.

Responses

There are various sub-cultural responses to the project. These sub-cultures can be separated into functional user groups, program user groups, and the PRISM team. The functional user groups are eager to be trained in the new tool. Since Raytheon as a whole has gone through numerous enterprise-wide changes, whether it is new mergers, IT systems, or re-organizations, this group anticipates a slow-down post deployment and a gradual recovery period while everyone learns to use the system. The program user groups are the ones interfacing with government clients and bring in revenue for the company. They are passive towards the system deployment as it may cause product delays. They are looking to the functional groups to use PRISM without disrupting productivity. They would rather not have PRISM and remain with existing systems. The PRISM team is the coordinating body to implement PRISM. They are proactively communicating to the rest of the user groups about PRISM. However, the passive support of the program offices may cause some challenges in driving full adoption of PRISM.

Recommendations

At Raytheon, business is conducted via personal relationships. Most of the high-level managers have worked for Raytheon for more than twenty years and they have rotated through multiple departments. Resources and funding are obtained through relationships among people. One way to gain acceptance for long-term success is to leverage the relationships among people and gain

buy-in through the social networks. Furthermore, change management tasks should be planned early and integrated into PRISM deployment planning. Program offices should be engaged early on so they can be more proactive in supporting PRISM deployment.

The next chapter describes the governance model development process and the resulting governance model, which takes account into the people management issues identified in this chapter.

6 Governance Model Development

This chapter describes the PRISM governance model development working group that was formed, as well as a framework for governance model development to analyze the as-is and to-be states of an organization. Then based on the criteria of the to-be state of the organization, various governance models are proposed. Using a matrix selection process, an optimal governance model is selected that addresses features of the to-be state.

6.1 PRISM Governance Model Development Working Group

The PRISM governance model development working group was led by the SAS IT Director. The formation of the group was incentivized by the lack of integrated, robust enterprise process to prioritize PRISM change requests.

The current governance in Figure 23 below shows the various governing bodies from users groups, to change control review board, to ERP governance council.

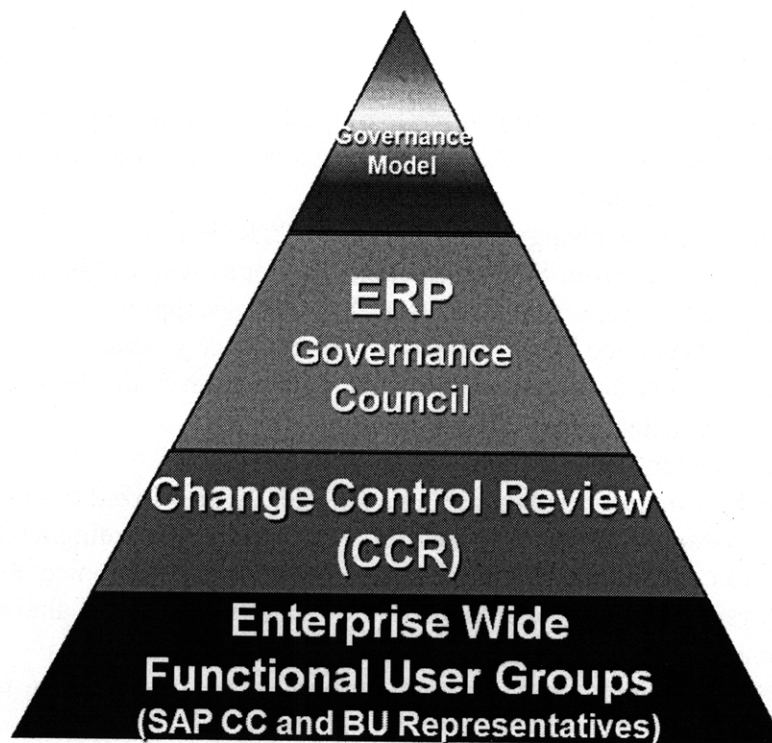


Figure 23. Current SAP ERP Governance Model¹³

Enterprise Wide Functional User Groups: this group consists of representatives from SAP Competency Center and business units. This group brings together various perspectives and needs from business units to prioritize changes to SAP system. It also supports development, testing, and implementation activities. Having the user groups promote common business

¹³ PRISM Governance and Support Model.ppt (April 2009)

processes as various business units' representatives discuss their needs. Also, the user group facilitates knowledge transfer between PRISM Competency Center and business unit support groups. This group is lead by SAP Competency Center Business System Experts (BSEs) with business unit BPE Participation.

Change Control Review (CCR): This group consists of BSEs, user support group leads, and business unit representatives. This group approves and rejects change requests to address unresolved user group issues. It also validates user group priorities based on SAP technology roadmaps. During the review process, this body identifies SAP solutions to meet business needs. At the same time, it can standardize and optimize functionality across all PRISM functions to support enterprise common business processes.

ERP Governance Council: This group consists of vice presidents of business units as well as at the corporate level. This council establishes senior leadership support and prevents duplicative solutions, or solutions that proliferate legacy solutions or third party applications in order to drive enterprise common business processes. The council also defines strategic technology roadmaps and address unresolved issues

Current Governance Model Issues:

The current governance model was designed while only MS business unit is using PRISM system. With respect to the addition of SAS and NCS business units, the governance model should address the following issues:

- Operational management/change control review (CCR) board:
 - Decision drivers are from SAP competency center as well as the MS user support group. Often times, representatives from SAS-Mississippi were not present
 - Inconsistent attendance by CCR board members, user groups
 - Communications regarding system changes come from multiple sources
- Integration and prioritization of cross-BU issues:
 - Poor or insufficient business unit participation
 - System improvements/changes are not consistently prioritized within user groups based upon business value or consequences of not implementing a requested change
 - Decisions to delay addressing requests are not always communicated. As a result, some requests remain in the queue with no proactive pursuit of alternative solutions.
- Integration of cross-BU processes
 - SAS/NCS user support team is not yet formed to own user support, benefits documentation, and change deployment activities
 - Lack of governance body to develop and maintain enterprise standard processes
- User Support/cross-BU Issue Resolution
 - Difficult to determine which support organization to contact (e.g. Raytheon IT, network administrators, SAP competency center, etc.)
 - Multiple solutions developed to resolve same business problem – no knowledge sharing or standardized solutions
- Training
 - No centralized group that owns development, maintenance, and delivery of training

- ERP enterprise roadmap
 - Lack of agreed ERP enterprise roadmap to designate ongoing resources allocation and investments in system upgrades/improvements
 - Lack business governance to push back on one-off solutions

To address the above issues, the PRISM governance development working group was formed under the leadership of SAS IT Director who reports to SAS CIO, who ultimately reports to the corporate CIO responsible for the PRISM system. Team members of the working group include Director of SAP Competency Center - Operations, key members of the PRISM Enterprise Team, user support group leads from MS and SAS, Directors of MS IT, Directors of SAS IT, Directors of NCS IT, functional directors, and business unit IT managers. The business unit IT managers and directors work with the functional directors to address all IT issues including PRISM. The IT managers/directors serve as conduits between the business and IT groups ensuring functional needs are met through appropriate IT tools. The working group is responsible for developing a governance model and associated process to be proposed to Raytheon leadership for adoption as the enterprise PRISM governance model.

6.2 Governance Model Development Framework

The frame work used to develop the governance model is derived from Enterprise Value Stream Mapping and Analysis (Nightingale and Stanke 2005). The methodology provides guidance in the development of a transformation plan for transforming the enterprise from its current state to the desired future state.

The first step, analyze enterprise’s as-is and to-be states, produces a set of governance model design criteria that enables the achievement of the to-be enterprise. The second step, analyze gaps and develop candidate governance models using enterprise views, outputs a set of candidate governance models that fit the criteria of the to-be organization. And the last step, select optimal governance model, outputs the desired governance model with the best fit to the desired criteria of the to-be state. Figure 24 below is an illustration of the governance model development framework.

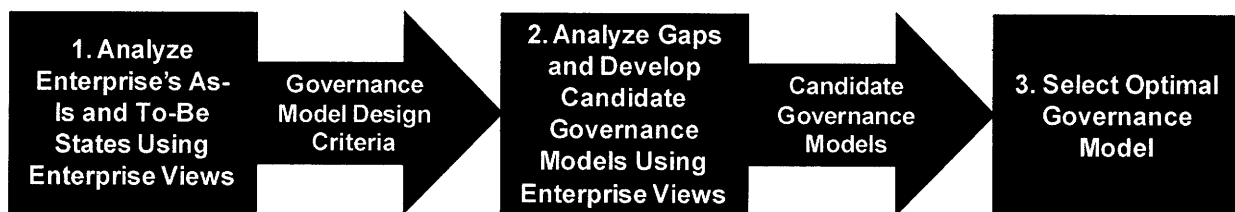


Figure 24. Governance development framework

Step1: Analyze Enterprise’s As-Is and To-Be States Using Enterprise Views

Based on research from MIT Lean Advancement Initiative by Professor Deborah Nightingale and Professor Donna Rhodes, the current state analysis of an organization can be done through eight architecture views as illustrated in Figure 25 below¹⁴.

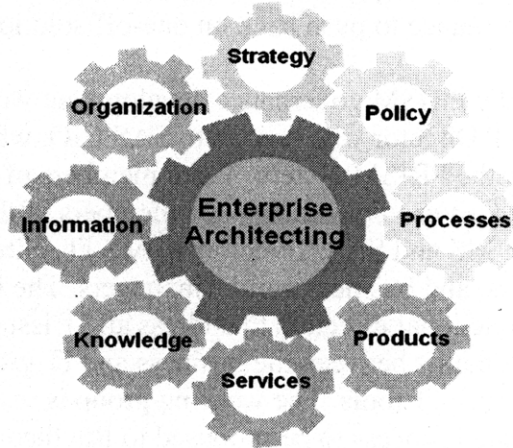


Figure 25. Enterprise architectural views

Strategy: This view represents goals, vision and direction of the enterprise and includes the business model and competitive environment

Process: This view represents the core processes by which the enterprise creates value for its stakeholders

Organization: This view represents organizational structure as well as relationships, culture, behaviors, and boundaries between individuals, teams and organizations

Knowledge: This view represents the implicit and tacit knowledge, capabilities, and intellectual property resident in the enterprise.

Policy/External Factors: This view represents the external regulatory, political and societal environments in which the enterprise operates

Information: This view represents the information needs of the enterprise, including flows of information as well as the systems and technologies needed to ensure information availability

Product: This view represents the products produced by the enterprise

Services: This view represents the services of the enterprise, including services as a primary objective or in support of products

These views describe the interrelationships within an organization. Therefore, assessing organization architecture needs through these eight views enable comprehensive organization designs. The illustration in Figure 26 below demonstrates the integrated nature of

¹⁴ Nightingale, Deborah J., and Donna H. Rhodes., MIT, 2007, *03-Lecture ESD.38J - Holistic Thinking for Enterprise Architecting* 02/11/2009

organizations¹³.

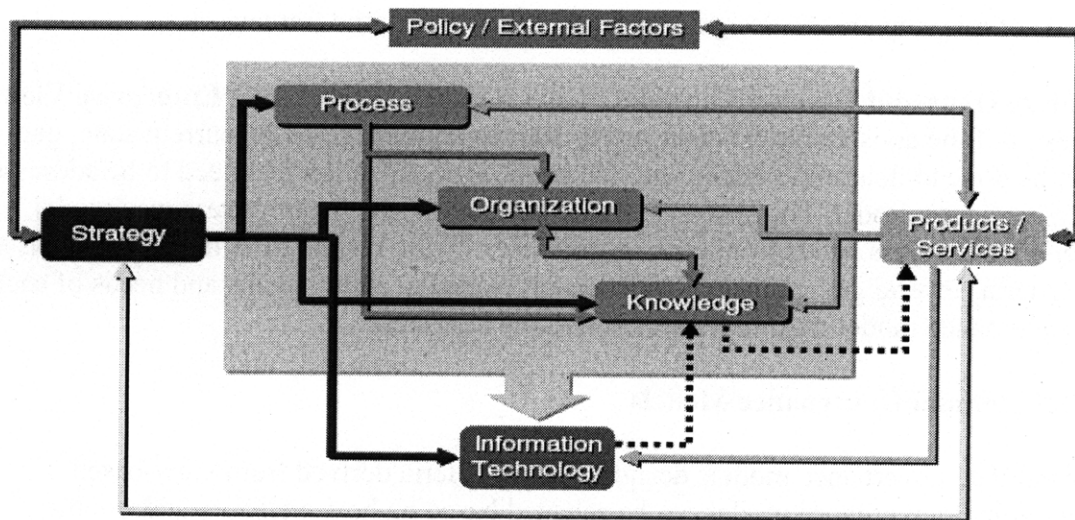


Figure 26. Interrelationships of enterprise views

Figure 27 below¹³ illustrates an example of views related to an objective to reduce time to market for a firm.

EA Example: Reduce Time to Market Imperative

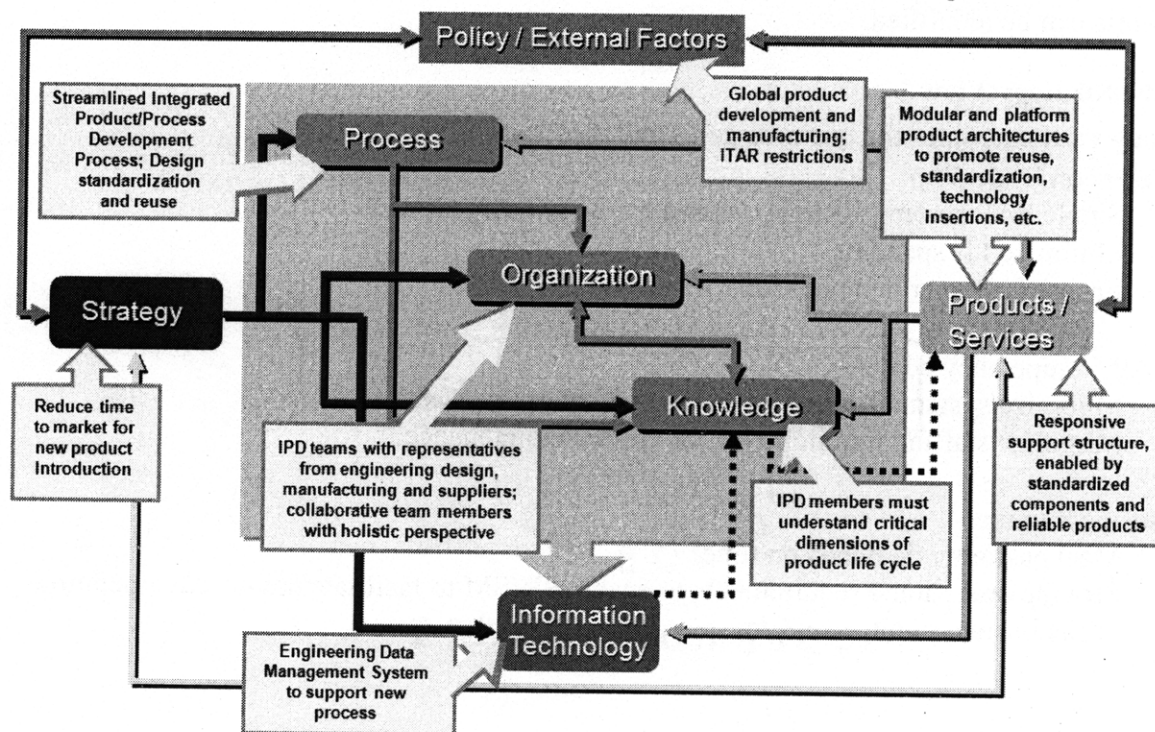


Figure 27. Example of interrelated enterprise views

The outcomes of this step are the design criteria used in step 2 of the framework.

Step2: Analyze Gaps and Develop Candidate Governance Models Using Enterprise Views

Using the result of the as-is and to-be analyses, as well as knowledge of the current state, gap analysis can be done to determine issues with the existing organization that need to be addressed in the new governance model. The analyses enable generation of a list of governance model design criteria that address needs from each of the views. Using results from the gap analysis and the design criteria, several governance models are developed to address gaps and needs of each view. The governance model candidates are used in the next step.

Step3: Select Optimal Governance Models

Using the candidate governance models designed using criteria derived from view-based analysis, an optimal governance model can be selected based on how well they address the design criteria.

6.3 Step 1. Analyze Enterprise's As-Is and To-Be States Using Enterprise Views

The SAP-related stakeholders can be considered an enterprise within Raytheon whose function is to develop, implement, and continuously improve PRISM for its users among various business units. Using enterprise views analysis, consisting of strategy, process, organization, knowledge, products/services, information technology, and policy/external factors views, desired governance model criteria can be identified.

6.3.1 The Strategy View

The strategy view examines the business goals and directions of the enterprise.

- Raytheon leadership:
 - Single SAP system, PRISM, is used by every business unit
 - Minimize IT spending
 - Ensure customer demands are met

- SAP Competency center:
 - Minimize system changes to enable one-enterprise system
 - Minimize staffing requirements for system maintenance.

- Business units:
 - Meet customer demands on time
 - Provide operational requirements to enable PRISM to facilitate day-to-day operations of the business unit

In addition, according to the “Best Practices: SAP Competency Center” published by Forrester Research, Inc. (Miller, Byron, Kinikin and Herbert 2004), the following strategic capabilities are needed for Raytheon SAP CC.

- Achieve ERP Operational Excellence vision: managing, optimizing and balancing total cost of ownership affected by ERP – starting with PRISM.
- Reinforce governance decisions that maximize value for the enterprise.
- Facilitate business and IT collaboration and decision-making through integration points at all levels from users to Raytheon leadership team.
- Develop common enterprise business processes associated with PRISM.

As-Is: There are conflicting goals among key stakeholders. While Raytheon as a company desires one system with minimized cost, the business units may require system customizations in order to meet their customer commitments. A balance among cost, amount of customization, and minimized system changes needs to be determined. Decision powers reside mostly within the SAP Competency Center, which is located at MS site.

To-Be:

- One-Raytheon vision is reinforced through governance structure by minimizing business-unit system customizations and maximizing utilization of employees, inventories, sources of supply.
- Business and IT collaboration and decision-making facilitated through integration points at all levels from users to Raytheon leadership team
- Decision compliance is achieved through end-user execution.
- Solutions are aligned with enterprise technology roadmap, e.g. instead of a business unit specific solution that can be used for the enterprise, a single, enterprise solution should be developed.

6.3.2 The Process View

The process view examines the how change requests to the PRISM system is addressed in order to enable continued business operations.

As-Is: The change approval process was designed in anticipation of SAS-NCS implementation of PRISM. Therefore, the approval process was designed primarily to maintain MS business unit operations. When SAS-Mississippi site also begins to use the PRISM system, users of SAS-Mississippi encountered difficulties in using the change approval process to achieve requested changes in a timely fashion. Delays to change requests from SAS-Mississippi site often caused delays to production.

Origin of change requests:

- Front-line end users in functional areas of production control, supply chain, manufacturing and finance
- Functional managers, directors, etc.
- IT personnel, SAP personnel

To-Be:

- Governance body consists of comprehensive representation of decision makers from relevant business units
- Governance process enables just-in-time decision making
- Change process encompasses sufficient change management communications to all stakeholders impacted by change

6.3.3 The Organization View

The organization view examines the grouping and linking mechanisms of the PRISM governance body. The organization for ERP systems can be divided into strategic, executive, program, and operational groups.

As-Is: The strategic group, ERP Governance Board, consists of senior level executives (CXOs) within Raytheon. This board makes forward-looking decisions with regards to the strategic direction of the company both short-term and long-term.

The executive group, Integration Working Group, consists of vice presidents of various business units and functions. This group integrates among business objectives across various business units within Raytheon. This group makes IT portfolio and spending decisions with an overall enterprise view.

The program groups consist of many steering committees representing their respective IT systems, i.e. SAP, PeopleSoft, product data management (PDM), etc. Each program group aims to address the needs of its user communities spread across multiple business units.

The operational group consists of business unit-level support functions such as MS-PRISM user support group.

Figure 28 below is an illustration of the different groups from top-down to address governance needs of SAP ERP system.

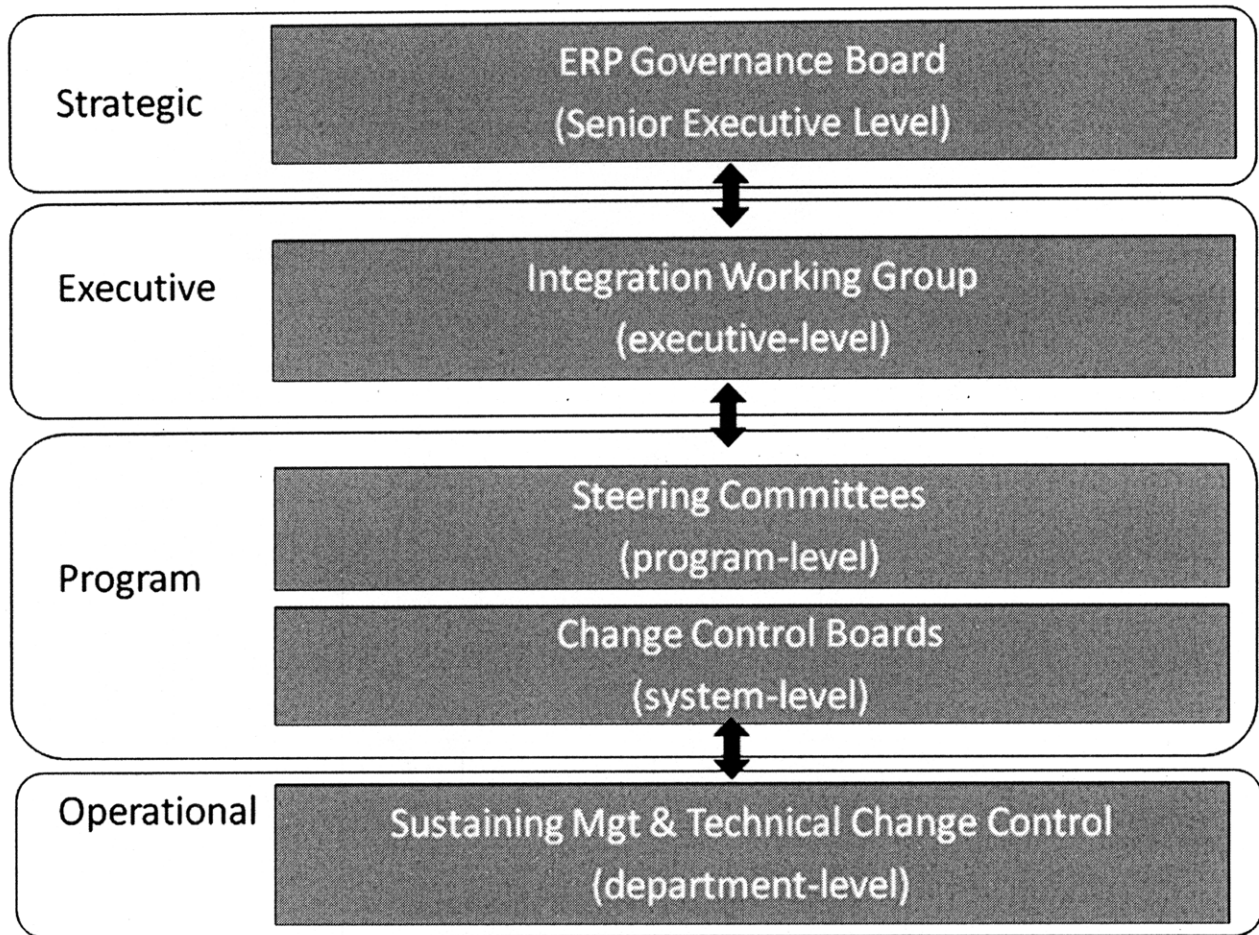


Figure 28. Raytheon ERP governance overview

From the PRISM governance perspective, the governance body should be at the program level for The PRISM system with support from operational level such as user support groups. Below is a depiction of the PRISM governance organization structure.

Figure 29 below depicts the current organization structure for PRISM governance.

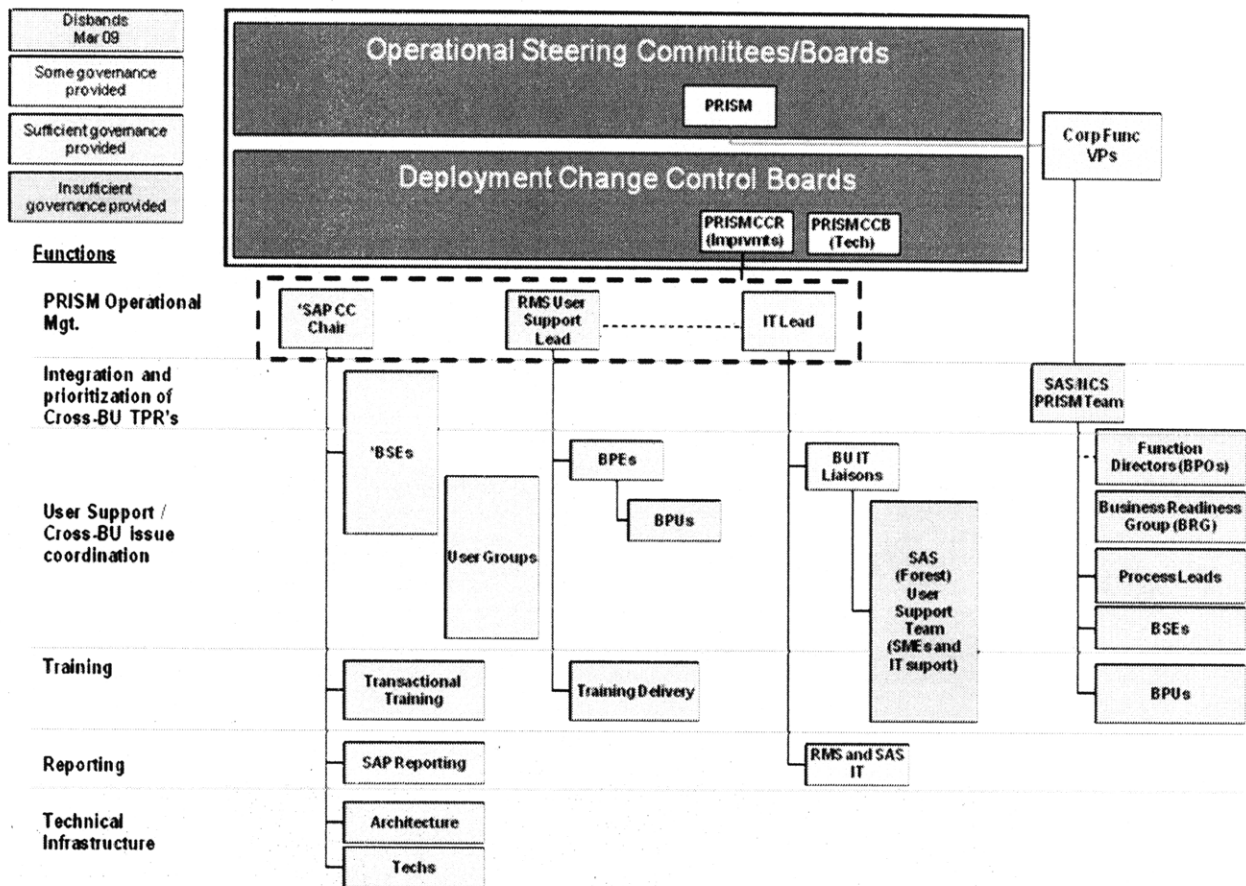


Figure 29. Current PRISM governance

At the operational level, PRISM has a steering committee staffed with corporate functional vice presidents and a deployment change control board. PRISM team reports to the steering committee. The PRISM team consists of the following members:

- Functional directors who are business process owners (BPOs) whose staff members are end-users of The PRISM system
- Business Readiness Group (BRG), responsible for preparing program offices and other business liaisons for PRISM adoption
- Process leads, who are experts in their respective business processes. They are responsible for determining, implementing, and testing business process requirements within PRISM.
- Business system experts (BSEs), responsible for technical configuration of The PRISM system. These experts are identified as star employees within their specific functions.
- Business power users (BPU), responsible for training all users within their business unit functions. They are also responsible for reporting user issues and facilitate in issue resolution.

The change control board consists of two groups, the Change Control Review Board (CCRB) and Change Control Board (CCB). The CCRB identifies and implements system improvements (e.g. additional system functions) while the CCB identifies and implements technical changes.

The functions executed by the PRISM governance body are as follows:

PRISM operational management: provides administration, budgeting, and overall management of the PRISM system. The SAP Competency Center - Operations (SAP CC) director provides management oversight over the competency center, RMS User Support Lead provides management oversight for user groups and support for user communities. IT Leads for respective business groups provide support to user support groups. All three, SAP CC Chair, RMS User Support Lead, and IT Leads, participate on the PRISM CCRB to approve changes to the SAP system.

Integration and prioritization of cross-business unit test problems reported (TPRs): All system and user problems change requests including break-fixes and system improvements are reported via a TPR electronic system. After each issue is entered into the TPR queue, they are prioritized within the user group. Changes agreed by user group representatives are then passed onto the CCRB. BSEs present a business case including estimated work hours to address the change during the CCRB meeting. With the deployment of PRISM to an additional 7,000 users, TPR integration and prioritization need to take an enterprise perspective. Currently, SAP CC BSEs approve and prioritize issues in the TPR queue. In addition, PRISM team leads also work with BSEs to add and process TPR requests as PRISM is implemented and being deployed to two additional business units. However, the entire PRISM team will disband by March 2009. This leaves BSEs the current group that prioritizes TPRs.

User support/cross-Business unit issue coordination: PRISM users are supported by BPU and user support groups. Issue resolution from various users and business groups should be coordinated to enable cross-pollination of resolution ideas. Currently, user support and issue resolution is provided by SAP CC BSEs who generate and implement solutions. There are also user groups from RMS where the user group leads help users identify resolutions and work with BSEs to implement solutions. Additionally, BPEs and BPUs within RMS user support group also provide assistance to users. For Forest, the user support group is from Mississippi facility's IT group. As for PRISM team, functional directors, BRG representatives, process leads, and BSEs all assist in issue resolution.

Training: user training and new process training should be deployed by BPUs and user support groups. SAP CC provides transactional training of the PRISM system while user support groups provide process training of the system. For Mississippi, the user support group provides training to users. Finally, within PRISM team, BPUs provide training to new users.

Reporting: current business reports are generated by the SAP Competency Center reporting group. Some business metrics are also generated by business unit IT groups.

Technical infrastructure: technical infrastructure supporting PRISM is designed, developed, and maintained by Raytheon IT architectural and technical groups.

As for the current governance status, the PRISM team will disband by March 2009.

PRISM roles need to be transitioned, particularly cross business unit function director coordination, business readiness coordination for additional system changes, process maintenance, and user support/issue resolution. As shown in pink on the above diagram, the Mississippi site does not have sufficient governance as their requests are not objectively prioritized and addressed. For areas with some governance provided (colored yellow in above diagram), PRISM steering committee, IT lead, BU IT liaisons, and RMS and SAS IT groups, more integrated governance needs to be developed to tie them into the overall PRISM governance. Lastly, areas where sufficient governance is provided need to be expanded to include additional stakeholders.

Challenge:

- Ensure coverage and smooth transition of PRISM team roles prior to the team disbanding in March.
- Expand current PRISM governance to include SAS and NCS business units and relevant stakeholders
- Provide proper governance process to ensure issue prioritization and management within enterprise objectives

To-Be:

- Governance body includes equal representation by additional business units
- Governance mechanism also includes maintaining and updating enterprise business processes.
- Governance process enables decision making for the benefit of the entire enterprise.

6.3.4 The Knowledge View

The knowledge view examines implicit and tacit knowledge, capabilities, and intellectual property within the enterprise. At Raytheon, business units have working councils that integrate the functional representatives from different business units, e.g. operations council includes representatives from SAS, NCS, MS, etc. However, knowledge sharing is not done consistently within all levels including operators and managers. Even though knowledge sharing efforts regarding PRISM implementation have been pursued by the PRISM team to leverage prior learning regarding PRISM implementation and adoption, the rest of the business unit functions have not proactively pursued knowledge sharing among business units partly due to critical day-to-day operational activities.

To-Be: Governance system facilitates knowledge sharing among business units and stakeholder

6.3.5 The Products/Services View

The products/services view examines the actual output and deliverable commitments to Raytheon customers. Each facility within a business unit is responsible for producing multiple lines of products, from micro-electronic components to room-sized defense systems. The

production of each product may require unique business process that cannot be accommodated by PRISM enterprise configuration. Therefore, certain product lines may require PRISM customized features.

As-Is: The need to customize conflicts with the one-Raytheon enterprise system goal. However, some customizations are necessary to meet customer demands.

To-Be: The governance body should make an appropriate assessment of customizations necessary for the enterprise.

6.3.6 The Information Technology View

The information technology view examines the role of IT as an enabler of processes, organization, and knowledge transfer within the enterprise.

As-Is: Raytheon business units IT groups own and maintain various IT systems to support the business unit. As a result, many disparate, disintegrated, legacy IT systems exist. The vision of one-Raytheon from the IT perspective is to implement PRISM to replace the legacy systems.

To-Be:

- Governance decisions shall ensure integration with existing IT systems and business processes
- Governance decisions shall be made based on maximizing enterprise benefits and minimizing IT costs

6.3.7 The Policy/External Factors View

The policy/external factors view examines factors outside of the enterprise that impact strategy and product decisions. External to PRISM, governmental regulations such as audits requiring documentation and paper trails of production process require PRISM to execute additional documentation features. Also, individual product lines and business units may have different requirements depending on the products manufactured.

As-Is: Policy and external factors result in the need to customize the PRISM system. This again, conflicts with the single enterprise The PRISM system view.

To-Be: The PRISM system produces all reports necessary for government audit requirements.

6.4 Step 2. Develop Candidate Governance Models Using Enterprise Views

A corporate ERP governance board was established during the last quarter of 2008. The corporate board aims to launch strategy reviews to integrate across process areas and support strategic level planning for ERP-related projects. However, the corporate governance structure does not address integration at operation levels for the PRISM system. Although the current operational level PRISM governance is designed to address the needs of the enterprise, however, additional integration among governance bodies needs to be considered as PRISM is deployed at

SAS and NCS business units. Below are list of observations consolidated from interviewing PRISM stakeholders including user support leads, BSEs, SAP CC management, and business unit IT liaisons that highlight current governance issues to be addressed by the improved PRISM governance model.

- Operational Management/Change Control Review (CCR) Board:
 - Inconsistent attendance by CCR board members, user groups
 - Communication from multiple sources
- Integration and Prioritization of Cross-BU TPRs:
 - Poor or insufficient BU participation
 - System improvements/changes are not prioritized based upon business value (ROI)
 - Aging requests are not actively addressed (e.g. order freeze during pick issue at Forest)
 - Getting priority requires social networking
- Integration of Cross-BU processes
 - CalTex user support group has not been formed to own user support, benefits documentation, and change deployment activities
 - Lack of governance body to develop and maintain enterprise standard processes
- User Support/Cross-BU Issue Resolution
 - Detailed troubleshooting needed in order to determine which support organization to “call” (e.g. network, IT, PRISM, etc.)
 - Factory performance is being impacted due to frequent outages
 - Process for reporting problems may not be communicated consistently or well-understood
 - Multiple solutions to the same business problem
- Training
 - No centralized group that owns development, maintenance, and delivery of training
 - In absence of CalTex user support group, CalTex users do not have resources assigned when PRISM team disbands
- Standard Enterprise Reports
 - Lack of common enterprise reporting strategy (report request via TPR addressed in ~4 wks)
 - Business units and sites have unique metrics
- ERP enterprise roadmap
 - Lack of agreed ERP enterprise roadmap
 - Lack business governance to push back on one-off solutions

6.4.1 Developing “To-Be” Governance Models

According to the research done by Peter Weill and Jeanne Ross detailed in *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*, the first activity in designing governance model is to determine guiding principles, assumptions and constraints for the desired governance model.

Guiding Principles

- Raytheon Business Community owns development and communication of
 - Business Strategy
 - Investment Portfolio Management (Business and IT)
 - Business Demand and Resource Management
- Process owners will define and enforce common business processes.
- Enterprise systems are the standard approach to providing information system solutions to Raytheon businesses.
- Unique PRISM-related business solutions sanctioned by the governance framework are allowed.

Assumptions

- Raytheon Board of Directors has directed we will leverage the investment in enterprise systems to achieve maximum operating efficiencies.
- All business processes can be within the scope of the enterprise systems architecture.
- Process owners will achieve and evolve common business processes.
- PRISM-enabled processes and systems will be the initial scope for the ERP governance model.
- Governance will cause decision making to be visible.
- Representation in the governance entities will be broad enough to ensure good decisions but limited to enable agility.
- Cross-process integration of system changes will be performed prior to project design approval.

Constraints

- PRISM processes and systems must be in compliance with pertinent government regulations (ex: MMAS 10 Key Standards, SOX).
- Contractual obligations to a customer may limit the ability to adopt standard operating processes and systems.
- Achieving governance objective is constrained by the business units' willingness to commit to enterprise solutions.
- Business strategies exist to maintain independent operating entities.

6.4.2 Views as Criteria for Governance Model Design

The “to-be” governance model shall address the future states of each of the views. These future states are the requirements of the new governance model. These requirements are:

Strategic

- One-Raytheon vision is reinforced through governance structure by minimizing business-unit system customizations and maximizing utilization of employees, inventories, and sources of supply.
- Business and IT collaboration and decision-making are facilitated through integration points at all levels from users to Raytheon leadership team.

- Decision compliance is achieved through end-user execution.

Organizational

- Governance body consists of comprehensive representation of decision makers from relevant business units.
- Governance process enables just-in-time decision making.
- Change process encompasses sufficient change management communications to all stakeholders impacted by change.

Process

- Governance body includes equal representation by additional business units.
- Governance mechanism also includes maintaining and updating enterprise business processes.
- Governance process enables decision making for the benefit of the entire enterprise.

Knowledge

- Governance system facilitates knowledge sharing among business units and stakeholders.

Products/Services

- The governance body shall make appropriate assessments of customizations necessary to the system from the enterprise benefits perspective.

IT

- Governance decisions shall ensure integration with existing IT systems and business processes.
- Governance decisions shall be made based on maximizing enterprise benefits and minimizing IT costs.

Policy/External

- The PRISM system produces all reports necessary for government audit requirements.

6.4.3 Candidate Governance Model Development Methodology

In addition to the views, the STAR methodology (Kates and Galbraith 2007) is used to explore further criteria for governance design. The STAR methodology is illustrated in Figure 30 below.

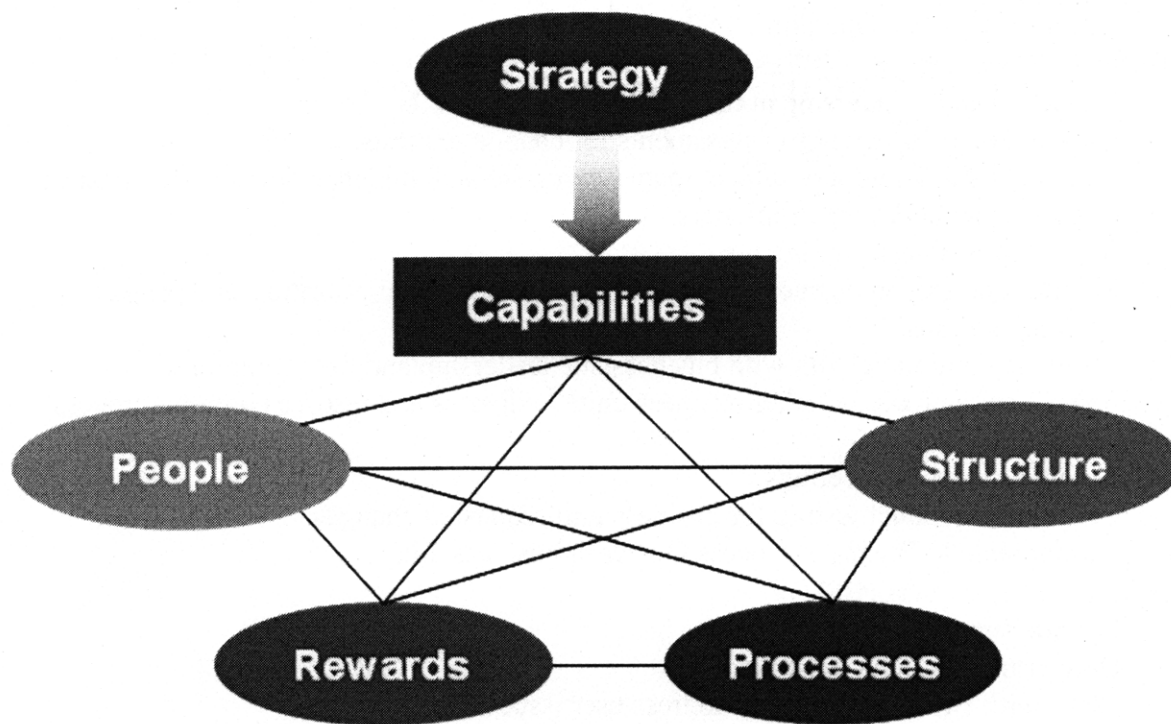


Figure 30. STAR methodology

The methodology considers people, strategy (capability), structure, processes, and rewards when designing an organization. Compared to the eight-view analysis, where people aspects are included in every view, the STAR model focuses on the roles and skill sets needed for the organization. The strategy (capability) and processes aspects in this model overlap those in the eight-view analysis. The structure and rewards aspects were not explored within the eight views. Therefore, this section will delineate the roles and responsibilities for the desired governance model, the structure of the governance body, and the reward system to align people's incentives with the governance body objectives.

People: need to have the right expertise at the right levels in order to make appropriate decisions for enterprise The PRISM system. The following lists groups of people and their responsibilities within PRISM governance.

- Business Systems Experts (BSEs)
 - Enable the enterprise system by helping business unit representatives to understand system capabilities and make informed change requests.
 - Own and maintain user group processes, communications, documentation.
 - Provide subject matter expertise and guidance on requested changes to BPE's and IT Service Providers.
 - Participate in Cost/Benefit assessments for change requests.
 - Support IT Leads to update TPR status in Quality Center and publish weekly status reports.

- Accountable to IT Operational Service Provider.
- Business Process Experts (BPEs)
 - Provide change leadership at the business unit level.
 - Participate in Cost/Benefit assessments for change requests.
 - Provide business process subject matter expertise and guidance on requested changes to BSE's and IT Service Providers.
 - Represent business unit interests.
 - Monitor changes in business rules and processes, regional priorities, and project implementations.
 - Facilitate communication with business/site leadership and user community.
 - Engage counterparts at other business units to discuss and resolve common process issues.
 - Attend user group meetings.
 - Coordinate/conduct testing for business unit requested changes.
 - Accountable to Business Process Owner in business unit.
- Business Power Users (BPUs)
 - Provide support to users.
 - Deliver user training when needed.
 - Work with BPEs and BSEs to address user issues.
 - Facilitate communication within user communities.
 - Escalate issues to user support groups.
- User Groups
 - Coordinate flow of information between IT Operational Service Providers, Business Unit support groups and functional organizations.
 - Promote common business processes across sites and functions that are supported by enterprise systems.
 - Review and reach consensus on enhancements, corrections, and changes to enterprise systems.
 - Provide input to Process Owners on priority of change requests for development and implementation into the enterprise systems.
 - Provide status of work in progress.
 - Support development, test, and implementation activities to ensure successful transition of enterprise system changes into production.
 - Accountable to Business System Experts.
- IT Liaisons
 - Custodians for the enterprise application systems.
 - Ensure operational viability of the enterprise systems portfolio.
 - Execute systems development projects.
 - Provide technical guidance to Process Owners in developing systems strategies.
 - Provide input to budget management process.
 - Manage systems portfolio within established budgets.
 - Manage software vendors and COTS software licensing.
 - Accountable to respective CIO's.
- User Support Groups

- Provide SAS/NCS/RMS PRISM end-user support through personal user attention, responsive help desk and well-understood issue escalation process.
- Continually improve the standard business processes (automated and manual) and reinforce common usage.
- Work with all SAS/NCS PRISM end users to quantify the benefits derived from incorporating PRISM into standard operating procedures.
- SAP CC
 - Architect and implement The PRISM system.
 - Develop system transaction training materials and train the trainer in using the system.
 - Update and maintain The PRISM system.
 - Work with business units and user support groups to address change requests.
- Function Directors
 - Own business processes within his/her functional area.
 - Manage operational staff members who are also users of PRISM.
 - Drive changes within his/her organization.

Structure: The optimal organization structure is the matrix organization structure, which promotes the following features of an organization:

Balanced perspective: Incorporates multiple business unit and functional perspectives

Flexibility: enables allocation of scarce or expensive talent, as well as flexible configuration and deployment of teams around projects. With regards to SAP decisions, many expensive resources such as functional directors and SAP experts will be needed to form appropriate teams to resolve SAP issues.

Integration: builds linkages across organizational boundaries and promotes integrated solutions. As an SAP solution would impact all business units using the system, an integrated organization is critical to incorporate the requirements from all stakeholders in developing SAP solutions.

However, matrix organizations are typically hard to manage due to potential for power struggles, decision-making conflicts, and personnel stress as a person may have two managers. To mitigate power struggles, Raytheon should allocate dedicated resources specifically for the task of resolving SAP issues and develop solutions. Raytheon should also determine “Best Practices” with regards to The PRISM system usage by developing a sub-team to capture and standardize best-practice processes. In terms of decision making, a robust, just-in-time decision process needs to be developed to minimize decision strangulation. See next chapter on governance process. And lastly, personnel stress can be minimized by integrating PRISM tasks into performance review objectives and gaining agreement from manager(s).

Rewards: Align rewards with performance rating.

As suggested from Company A in the industry benchmarking analysis section, performance review criteria must be aligned to promote PRISM adoption. A reward system should be

developed to recognize high performance with regards to PRISM usage and compliance tied to associated metrics, as well as collaboration on resolving PRISM issues. Managers should be assessed by how well they address organization issues related to PRISM, and how they drive change through the organization.

6.4.4 Candidate Governance Models

Based on the STAR methodology and considerations within the needs of Raytheon, three governance models are developed: distributed, SAP-centric, and integrated. The first governance model is distributed illustrated in Figure 31 below. A second proposal is an SAP-centric model illustrated in Figure 32. And a third proposal is an integrated governance model illustrated in Figure 33.

Distributed

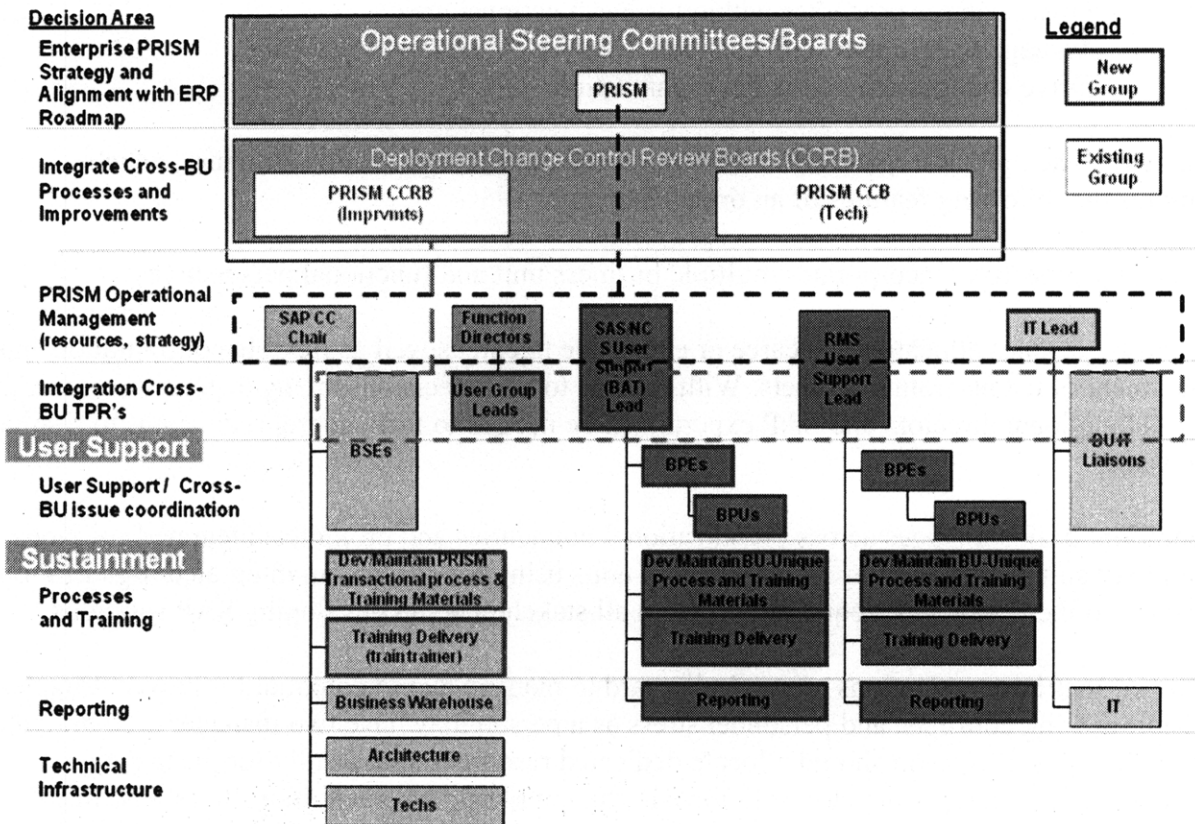


Figure 31. Distributed Governance Model

In the distributed model, the PRISM steering committee which makes ultimate decisions regarding PRISM changes and funding is staffed by key stakeholders who are the SAP CC Chair, function directors, user support leads and the IT lead. Jointly, this group will have an enterprise perspective and be able to make decisions regarding system changes.

In addition, a PRISM change control review board (CCRB) reviews improvements to the system. This board is staffed with business system experts, user group leads, user support group leads as well as BU IT liaisons. This group of people works closely with users in problem resolution and will be able to provide enterprise perspectives on improvements needed.

To support users, the BSEs, BPEs, BPU, and BU IT liaisons are needed to help users in resolving system usage issues or addressing improvement needs.

To sustain the system, SAP CC would conduct PRISM transaction process and develop associated training material, as well as delivering the training. Business process training materials and delivery are to be conducted by business user support groups. In terms of reporting, the business warehouse group within SAP CC generates needed reports. User group leads should also generate reports to track PRISM adoption and performance metrics. Also, IT groups are still responsible for generating business reports that cannot be generated via PRISM. In terms of technical architecture, a designated SAP CC group is responsible for designing, developing, and maintaining the technical architecture of the SAP system.

SAP-Centric

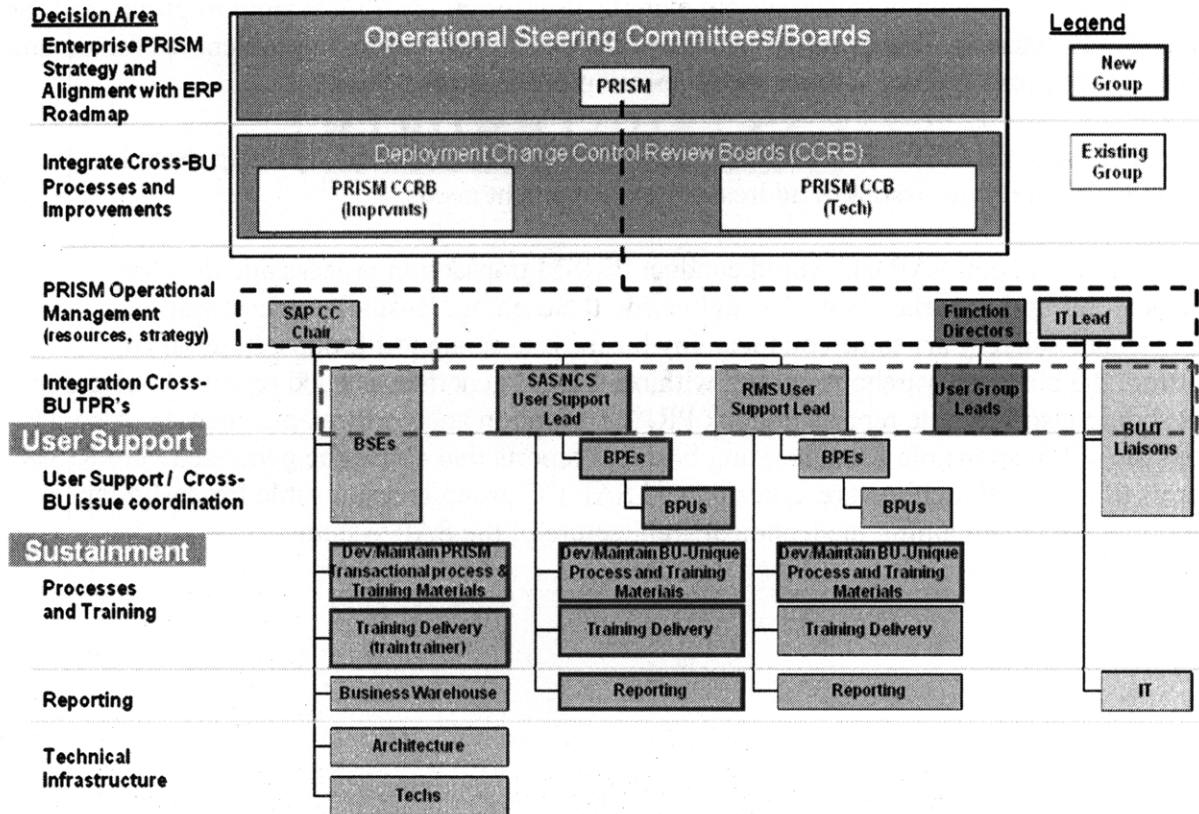


Figure 32. SAP-Centric Governance Model

This model is similar to that of distributed with the exception that the user support leads report to the SAP CC Chair. This design minimizes the number of representation in the steering committee to the SAP CC chair, function directors, and IT lead. This group of people can assess changes from an enterprise benefits perspective. To review PRISM improvement changes, the BSEs who work with users and provide solutions to user issues, the SAP user support leads, the user group leads, and BU IT liaisons all represent different aspects of the SAP system to ensure all concerns are addressed before an improvement is implemented.

Integrated

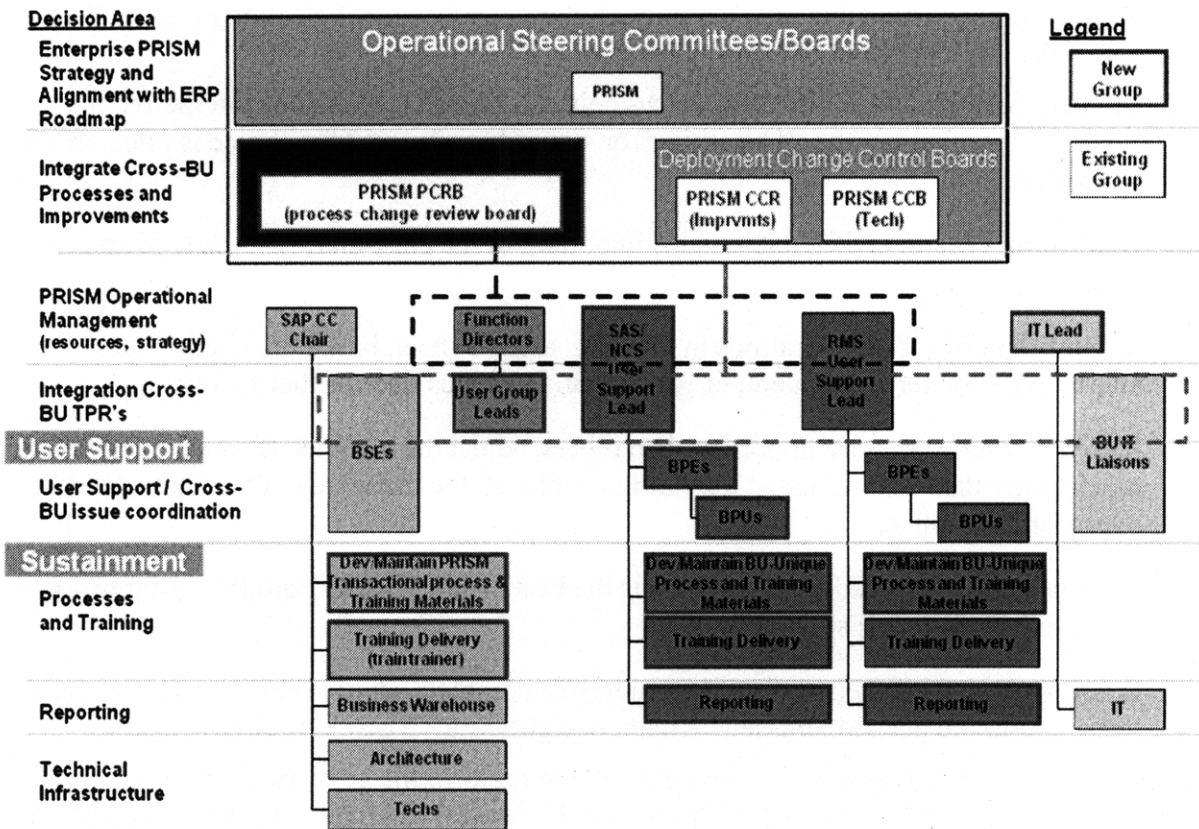


Figure 33. Integrated Governance Model

In the integrated model, a new board, Process Integration Council with a PRISM Process Change Review Board (PCRB) is created with membership from function directors and user support leads. This board is responsible for determining PRISM changes related to business process changes. For instance, a business unit with a certain product requires a customization within PRISM. This customization would also include change in existing business processes. The function director would have knowledge of business processes, while the user support leads have experience interacting with the users as well as in-depth knowledge of the system. These two stakeholder groups can make viable decisions from an enterprise perspective regarding business process changes needed for PRISM improvements. Also, the PRISM CCB would consist of BSEs, user group leads, user support leads, and BU IT liaisons, same as in the SAP-centric model. By having user support groups as separate entities to SAP CC, the user support groups can make user-based decisions regarding system changes to ensure user needs are addressed from an enterprise benefits perspective.

6.5 Step 3. Selecting Governance Models

The optimal governance model is selected through the Pugh Concept Selection process. The basic steps of the Pugh Concept Selection Process¹⁵ are

1. Brainstorm alternatives, list them across columns of sheet. Make one alternative the “default” — often it’s the “do-nothing” or status quo choice. This choice is rated zero for all criteria.
2. Brainstorm criteria and characteristics important to the customer. List them down rows of sheet.
3. Begin filling in 1, 0, or -1 ratings in the main area of sheet, based on whether that alternative is better, equivalent, or worse than the status quo for that criteria.
4. If some criteria are more important than others, adjust the weights. If some products are much better than others, adjust the rating weights in the main area of the sheet. Don’t go overboard with this.
5. Look at what the spreadsheet tells you is the best choice. Do you and the group feel good about that decision? If so, you’re done.
6. If not, look again at steps 1-5 — do you have a complete set of criteria, or was something important to the decision missed? Are the weights you’ve assigned close enough?

Table 3 below is the result of the Pugh process used to perform the governance model selection. The criteria of the governance model are listed in column with candidate models across the top row. Each concept is evaluated with respect to the first governance model, the distributed model, based on the criteria. If the candidate was worse than the distributed model, the intersection box of the row and column received a “-1,” If the candidate was better than the distributed model, the box received a “1.” In the event that there was no discernable advantage of one over the other the box received a “0.” The top candidate architectures have the highest sum of the columns.

Criteria	Governance Structure Candidates		
	Distributed	SAP-Centric	Integrated
Strategy			
Reinforce "One Raytheon" vision - minimize business-unit customizations and maximize enterprise value	0	1	1
Decision represent collaborative contribution from business units through integration points	0	0	0
Decision compliance achieved through user execution	0	0	1

¹⁵ Lean Software Engineering: Essays on the Continuous Delivery of High Quality Information Systems. "Pugh Decision Matrix." [Online] 6 February 2009. <http://leansoftwareengineering.com/pugh-decision-matrix/>

Organization			
Comprehensive representation	0	0	0
Just-in-time decision making	0	1	1
Sufficient change management communications	0	0	1
Process			
Business unit representation	0	0	0
Maintains/updates business processes	0	0	1
Enterprise-view decision making	0	0	1
Knowledge/IT			
Facilitates knowledge sharing	0	0	0
Products/Services			
Changes determined based on enterprise perspective	0	0	1
IT			
Integrates with existing IT systems and business processes	0	0	0
Maximizes enterprise benefits and minimizes IT costs	0	0	1
Policy			
System produces audit-compliant reports and outputs	0	0	0
Total	0	2	8

Table 3. Pugh Matrix Selection Process results

6.5.1 Comparing Discrepancies

The integrated model obtained the highest score of 8, indicating that it matched 8 of the listed criteria. The following compared each criterion where the integrated model received a rating of 1.

Strategy: Reinforce "One Raytheon" vision - minimize business-unit customizations and maximize enterprise value

Both the SAP-centric and integrated models help reinforce the one-Raytheon vision by minimizing business unit customizations. In the SAP-centric model, having SAP-oriented control of the system enables one central organization to reinforce the one system objective by reviewing change requests and ensuring system changes are minimized. In the integrated model, the process control review board reinforces the one-system objective to ensure changes are minimized.

Strategy: Decision compliance achieved through user execution

The integrated model excels in this aspect as it includes the process CRB with functional directors who can command change within their organization to ensure compliance to decisions made.

Organization: just-in-time decision making

Both SAP-centric and integrated models enable just-in-time decision making. In the SAP-centric model, the decision makers are within the SAP organization making fewer decision makers. In the integrated model, decisions are made within a committee of all relevant stakeholders. The decision process is designed such that decisions must be reached during the review board meeting or resolution is delegated to a task team.

Organization: sufficient change management communications

The integrated model provides the most sufficient change management communications as the decision makers are also function directors who can lead change among their staff members who are the key users of PRISM.

Process: maintains/updates business processes

The integrated model includes the process change review board which consists of functional directors who are ultimately responsible for business processes. These function directors are key to maintaining and ensuring accuracy of business process documentations.

For the following three criteria: **“Process: enterprise-view decision making”**, **“Products/Services: changes determined based on enterprise perspective”**, and **“IT: maximizes enterprise benefits and minimizes IT costs”**, the integrated model enables enterprise-view decision making through the process review board staffed by functional directors and other stakeholders who are responsible for collaborating and make decisions from the enterprise benefits and costs perspective. Also, the use of the PRISM steering committee enables the funding decisions to be escalated upwards to senior managers who have a view of the entire IT investment portfolios to justify needed decisions.

6.6 Optimal Governance Model Description

The high-level view of the optimal governance model is composed of SAP CC with involvement of all major functions, BU involved in operational management and cross-BU integration, BU user support groups involved in all aspects except SAP technical infrastructure, and IT involved in all but process training and SAP technical infrastructure. Figure 34 below is a depiction of the high-level integrated governance model.

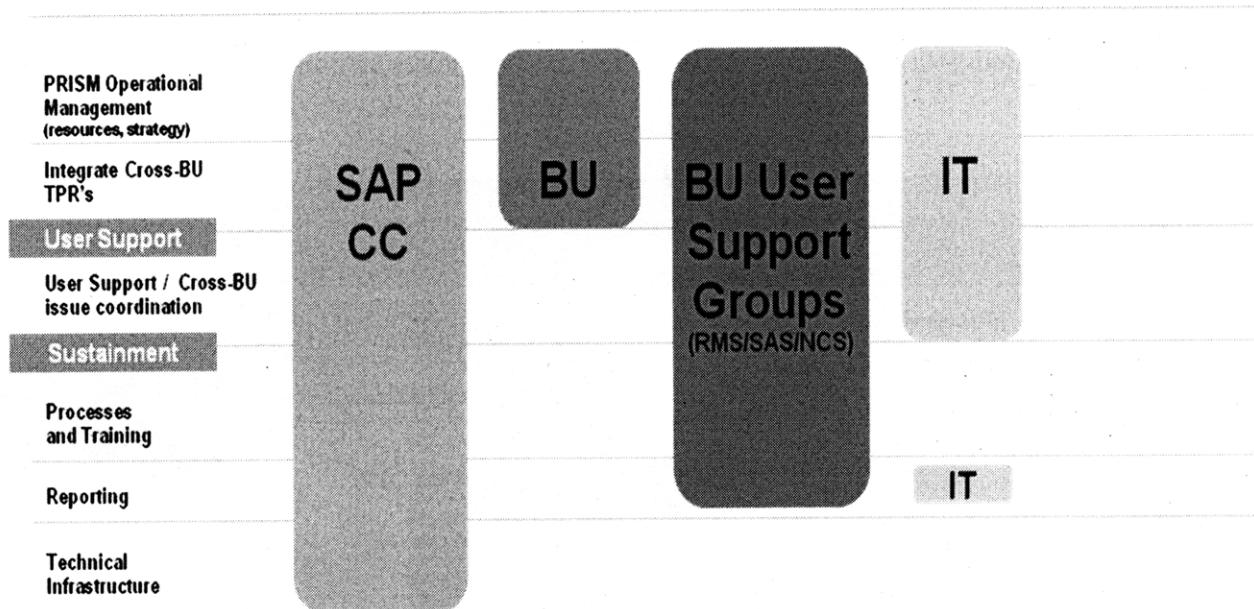


Figure 34. High-Level Integrated Governance Model

Figure 35 below shows a drill-down of functional levels and business groups with new functions highlighted in red outlines:

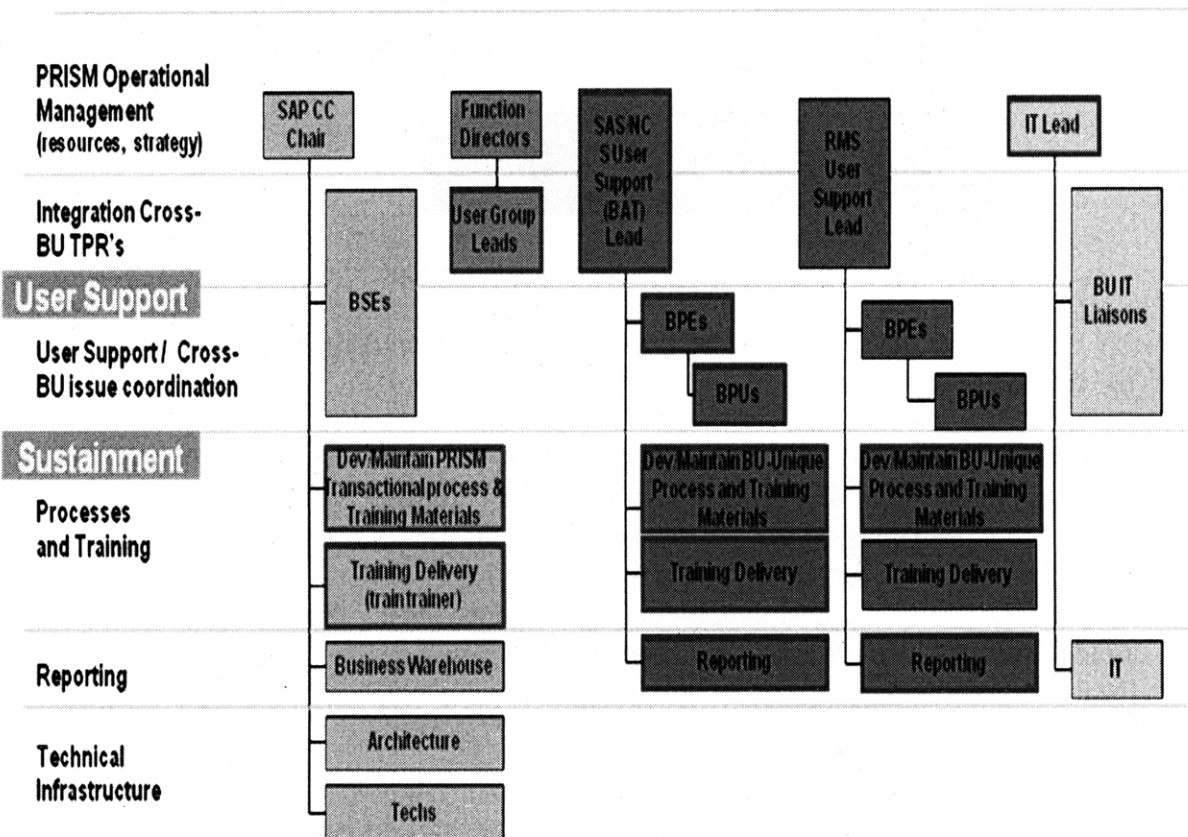


Figure 35. Drill-Down of Integrated Governance Model

The desired integrated governance model has the following features as illustrated in Figure 36 below.

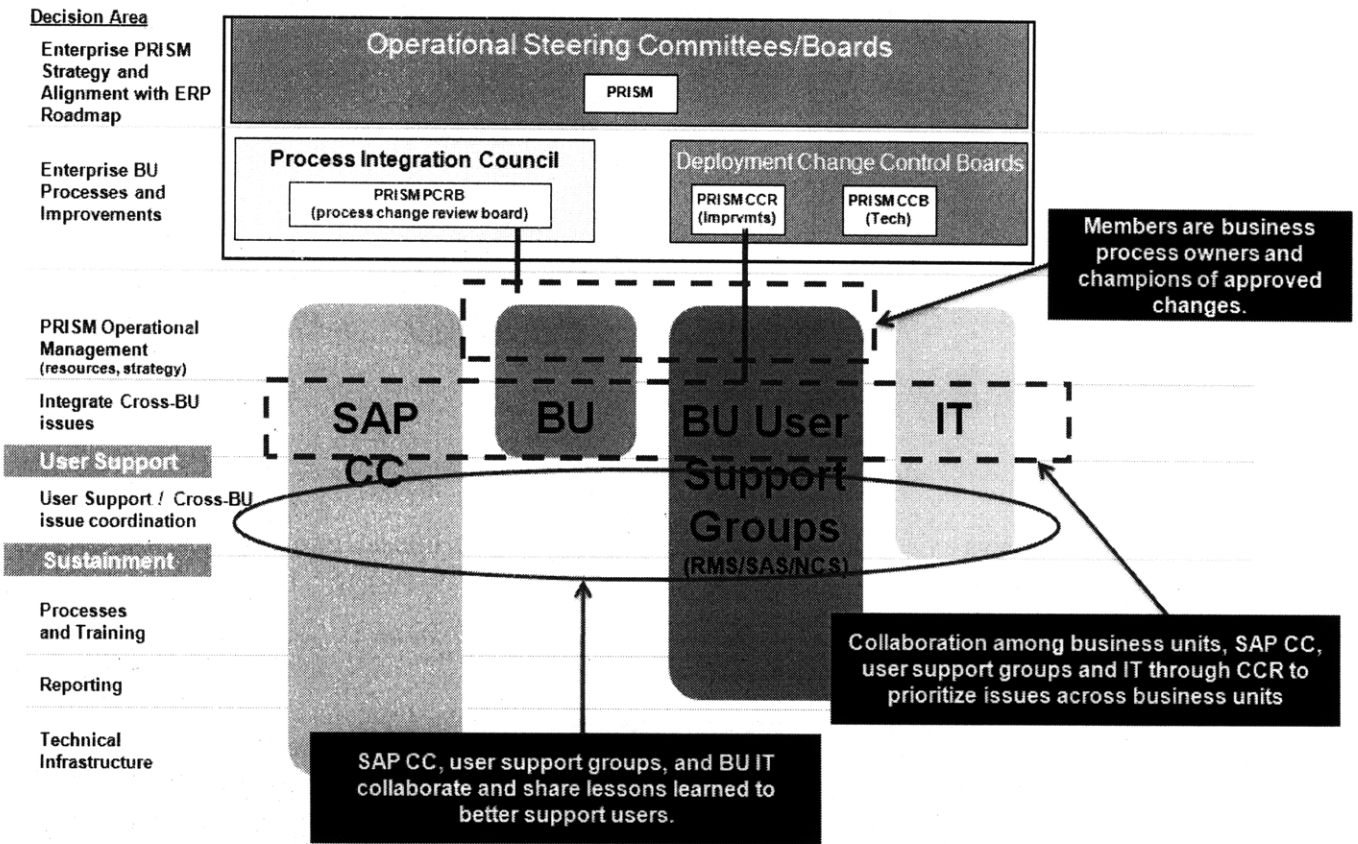


Figure 36. Optimal governance model

A proposal for the governance model to be presented to Raytheon corporate leadership team utilizes the following approach:

- Objective: Achieve ERP operational excellence vision by managing, optimizing and balancing total cost of ownership affected by ERP – starting with PRISM
- Use guiding principles, assumptions, and constraints to reinforce governance decisions that maximize value for the enterprise
- Facilitate business and IT collaboration and decision-making through integration points at all levels from users to Raytheon leadership team
- Establish Process Integration Council (PIC) to develop common enterprise business processes associated with PRISM

Proposed changes:

This section details the changes to each governance component including the charter and membership of each group.

- PRISM Operational Steering Committee
 - Charter - Proposed: Provide resolution for CCR board issues, provide guidance to CCR board on priorities, and champion agreed-upon decisions.
 - Membership - Proposed: BU and Corporate Functional VPs

- PRISM Change Control Review Board (CCRB)
 - Charter: Need to review current and revise as appropriate
 - Membership - Proposed: Leaders from SAPCC and BU IT, Operations, Supply Chain Management, User Group Leads (instead of function directors), and user support group leads

- Process Integration Council (PIC) – PRISM Process Change Review Board (PCRB)
 - Charter - Proposed: Own PRISM business process standardization, define requirements for The PRISM systems and associated reports to support those processes, maintain accuracy of process documentation and evolve the business processes.
 - Membership - Proposed: Functional directors (designees) and RMS/SAS/NCS user support team leads. Work products created by BPE's.

Gaps addressed:

The table below describes how the governance model addresses the gaps between the current and the future governance structures.

Operational management/change control review (CCR) board:	
Current: <ul style="list-style-type: none"> – Decision drivers are from SAP competency center as well as the MS user support group. Often times, representatives from SAS-Mississippi were not requested to be present – Inconsistent attendance by CCR board members, user groups – Communications regarding system changes come from multiple sources 	Future: <ul style="list-style-type: none"> – Decision drivers composed of representation from business units, IT, and SAP competency center – Established mechanism to reinforce participation and decision-making – Communications regarding system changes come from SAP competency center to BU IT personnel and from user support group to user
Integration and prioritization of cross-BU issues:	
Current: <ul style="list-style-type: none"> – Poor or insufficient business unit participation – System improvements/changes are not prioritized based upon business value or consequences of not implementing a requested change – Aging requests are not actively 	Future: <ul style="list-style-type: none"> – Comprehensive representation from BU, IT, and SAP CC ensures business value and consequences of not implementing a requested change are presented by BU representatives and understood by decision makers – Appropriate prioritization ensures

<p>addressed</p> <ul style="list-style-type: none"> – Getting priority requires social networking and using personal relationships to reach SAP competency staff who are able to make system changes 	<p>urgent requests are addressed</p> <ul style="list-style-type: none"> – Formal governance model ensures decision bodies and user support groups are in place to respond to user requests
<p>Integration of cross-BU processes</p>	
<p>Current:</p> <ul style="list-style-type: none"> – SAS/NCS user support team is not yet formed to own user support, benefits documentation, and change deployment activities – Lack of governance body to develop and maintain enterprise standard processes 	<p>Future:</p> <ul style="list-style-type: none"> – User support groups formed with objectives of supporting users, document benefits achieved, and manage change deployment activities – Process Integration Council facilitates development, maintenance, and compliance to standard processes
<p>User support/cross-BU issue resolution</p>	
<p>Current:</p> <ul style="list-style-type: none"> – Difficult to determine which support organization to contact (e.g. Raytheon IT, network administrators, SAP competency center, etc.) – Factory performance is being impacted due to frequent outages, some of which due to unannounced PRISM system changes – No standard closed-loop process for reporting problems – Multiple solutions develop to resolve same business problem – no knowledge sharing or standardized solutions 	<p>Future:</p> <ul style="list-style-type: none"> – Established process to resolve issues. For examples, users obtain help first from business power users. If BPUs cannot resolve issue, BPU will involve BSEs and work with the user to ensure problem resolution. If a process change request is needed to resolve the issue, the BSE will escalate to change control board – Established user support groups to ensure all changes are communicated to ensure factor performance is not impacted – Governance bodies ensures closed-loop process for problem resolution – Collaboration among governance bodies inherent in the proposed model ensures knowledge sharing and development of standardized solutions
<p>Training</p>	
<p>Current:</p> <ul style="list-style-type: none"> – No centralized group that owns development, maintenance, and delivery of training 	<p>Future:</p> <ul style="list-style-type: none"> – SAP CC owns transactional training material development, maintenance, and train the trainers – RMS, SAS, and NCS process training delivery owned by respective user

	support groups
ERP enterprise roadmap	
Current: <ul style="list-style-type: none"> – Lack of agreed ERP enterprise roadmap to designate ongoing resources allocation and investments in system upgrades/improvements – Lack business governance to push back on one-off solutions 	Future: <ul style="list-style-type: none"> – PRISM Steering Committee to determine and implement enterprise roadmap – Overall governance model designed to minimize one-off business solutions unless the solution is critical to business operations from an enterprise perspective

Table 4. Comparing Current and Future Governance Structures

The next chapter discusses the governance process for PRISM improvement initiatives.

7 Governance Process Development

Governance process development utilizes a similar current state – future state approach as used in governance model development. This chapter describes the current PRISM improvement approval process, the desired approval process and proposes an updated process to achieve the future state.

7.1 Current Governance Process

The governance process is used in context with managing system changes. Current changes are requested through an issue reporting process. When a user reports a problem that cannot be resolved by a business power user (BPU) from the user support group, the user contacts Raytheon corporate help desk. However, the help desk process is not integrated to the SAP resolution system and often times, the help desk personnel does not route the call appropriately to personnel at SAP CC. After a delay to a response, the user calls the SAP CC, usually someone he/she knows who is a Business Systems Expert (BSE). The BSE then collects information and submits a TPR. Figure 37 illustrates the current issue reporting process.

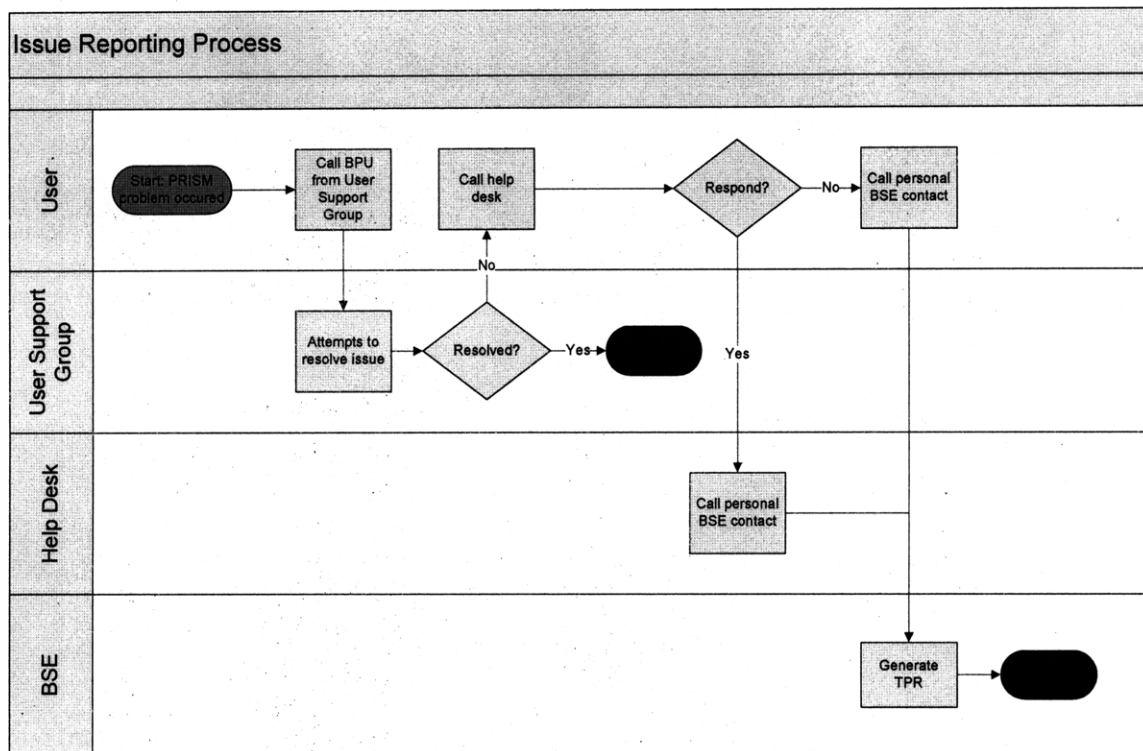


Figure 37. Current governance process

Once a BSE is notified of the issue, he/she starts the change review process using a TPR as illustrated in Figure 38 below.

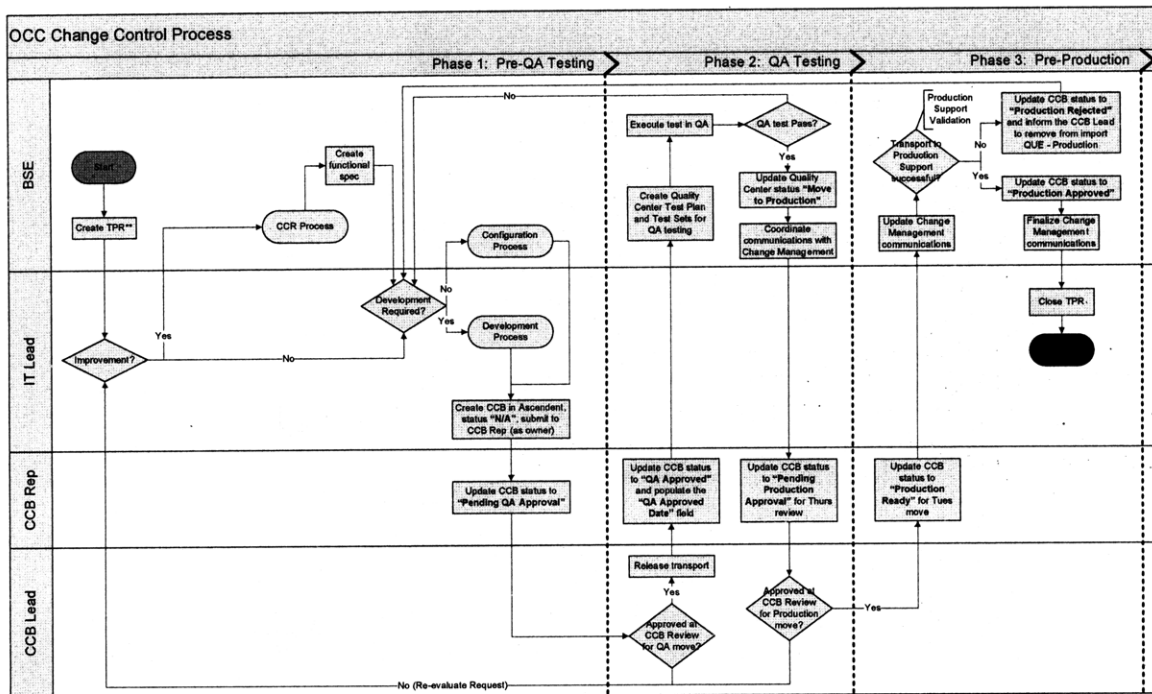


Figure 38. Change control process

The governance body will address decisions on improvement changes. These changes include PRISM functionality changes that would affect all users. Development changes are technical changes or system changes for break-fix items. The current change control review (CCR) process is Figure 39 below.

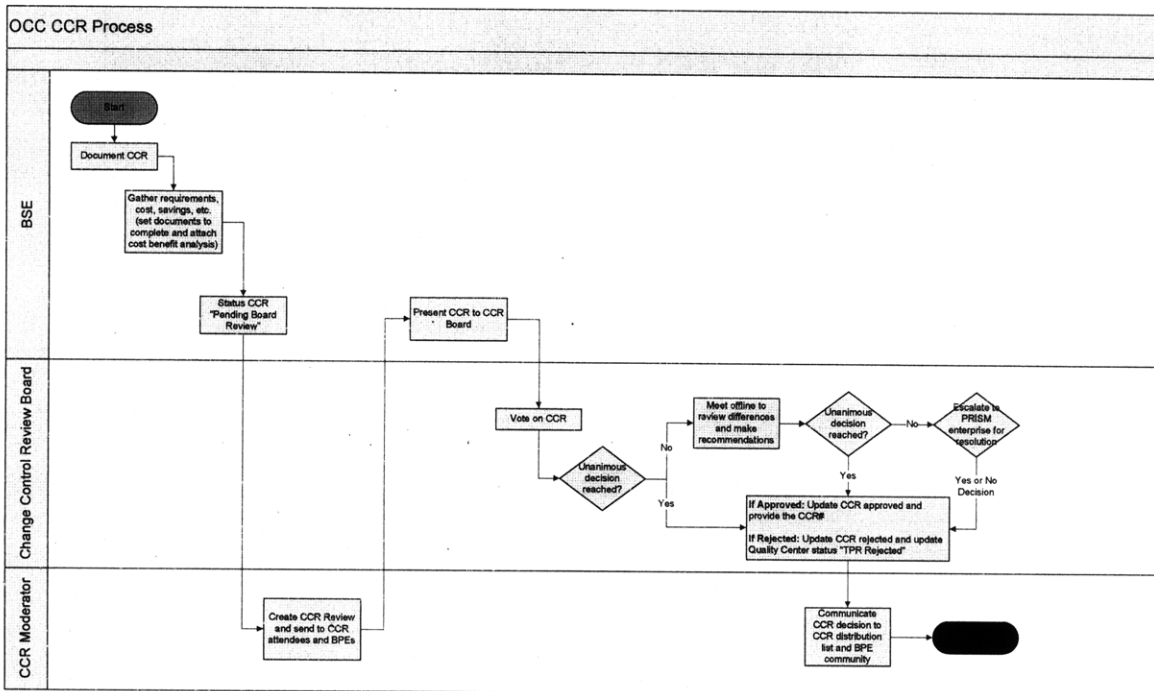


Figure 39. Current change control review process

7.2 Future Governance Process

The desired governance process consists of the following improvements from the current process:

- Streamline user problem reporting process. The user may reach out for help from three sources: the BPU, the help desk, and the BSE. To simplify the issue reporting process, the user should have a single point of contact responsible for providing a resolution and follow-up.
- Ensure comprehensive representation for change control review board (CCRB). Currently, the member list consists of various business units, but not all the business units affected by PRISM. Furthermore, attendance by members is inconsistent. Decisions made are sometimes delayed due to lack of adequate input.
- Unclear escalation point for unresolved CCR issues
- Hard to track consistency of implementing agreed decisions for changes.

The process is supported by the governance structure of having a Process Change Control Board. The PCRB is represented by function directors who can make decisions on processes as well as lead changes throughout his/her organization. Further, the CCRB consists of members from functional groups, IT, and SAP to provide input from all aspects impacted by a system change. The PCRB becomes the escalation point for process-related issues, while other issues are escalated to the CCRB. The steering committee is the final escalation point for PRISM issues above the change control boards. The steer committee consists of senior vice presidents who will

make ultimate decisions on changes as well as funding considering the corporation's strategic and process perspectives.

Figure 40 below is the desired process change review process.

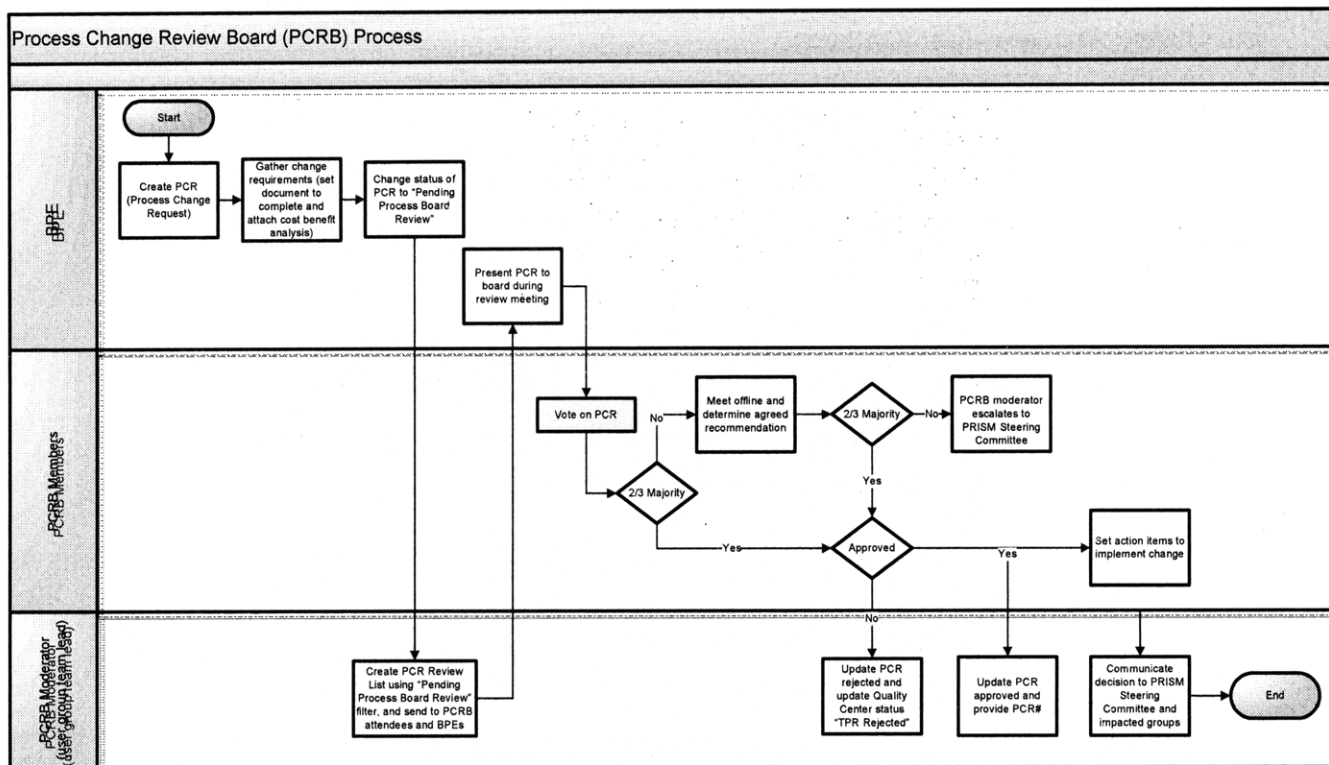


Figure 40. Desired future governance process

The next chapter discusses change management tasks necessary to implement the proposed governance model.

8 Implementation Plan

Successfully implementing the governance model will require various organizational, policy, and process changes as well as buy-in from the entire organization. The implementation plan consists of details of the governance structure and a phased approach to implement the governance model and change process within Raytheon.

8.1 Governance Structure Proposal

This section describes the details of the governance model proposal to be agreed upon as well as presented to corporate ERP governing board and other Raytheon senior executives. Figure 41 thru 46 are descriptions of each governance body group involved in PRISM management.

PRISM Steering Committee

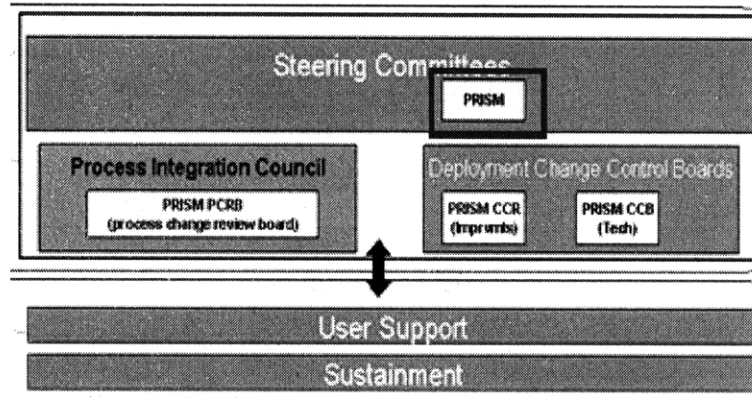


Figure 41. PRISM steering committee

Charter

- Resolves escalated PRISM issues
- Champions the enterprise solutions and common processes
- Provides data ownership, data quality and data management
- Ensures business readiness, timing and resource feasibility of integrated roadmap
- Coordinates business unit sponsorship and represents business unit requirements
- Provides change leadership within business units

Operating Model

- Chair: PRISM sponsor
- Meet once a quarter
 - No more than one hour
 - Decisions made for all agenda items or action items assigned
 - Special meetings called if critical issues surface
 - Attendance and meeting outcomes are tracked and reported to steering committee
- Alternates allowed if appropriate reasons are provided
 - Consistency in alternates critical
 - Alternates must be empowered to represent Board member
 - Respect and accept decisions made by team in the event of absence

- PRISM Steering Committee Members
 - Corporate VP of Operations
 - Corporate VP of IT
 - SAS CIO, COO
 - NCS CIO, COO
 - RMS CIO, COO

Process Integration Council

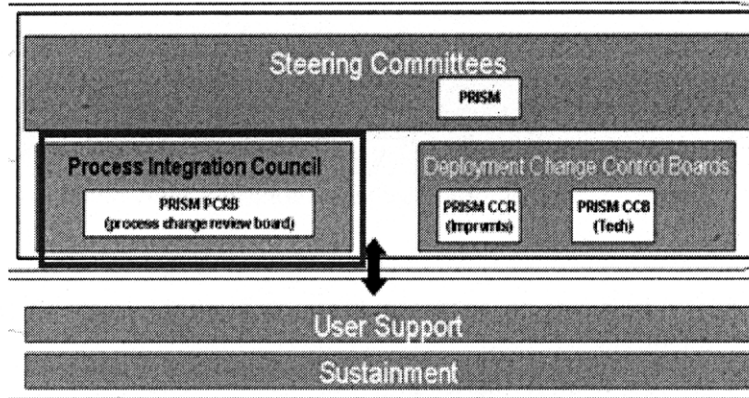


Figure 42. Process Integration Council

Charter

- Defines cross-functional process integration roadmaps
- Leads benefits realization during major deployment transitions
- Approves/rejects all additions or changes to cross-functional process integration roadmaps
- Owns end-to-end process definitions.
- Owns the process health metrics and total cost of ownership (TCO) model for process across company
- Prioritizes system investment strategies and ensures strategic alignment
- Champions the enterprise solutions and common processes
- Proposes system investment strategy for their process areas
- Owns the sustaining and investment budgets for IT support organizations
- Resolves conflict across business units within process area

Operating Model

- Meet once a month
 - No more than one hour
 - Decisions made for all agenda items or action items assigned
 - Special meetings called if critical issues surface
 - Attendance and meeting outcomes are tracked and reported to steering committee
- Alternates allowed if appropriate reasons are provided
 - Consistency in alternates critical
 - Alternates must be empowered to represent Board member
 - Respect and accept decisions made by team in the event of absence

PRISM Process Change Control Review Board

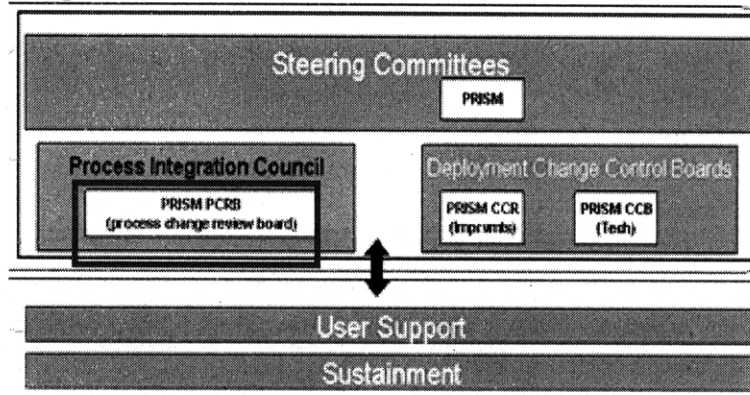


Figure 43. PRISM process change control review board

Charter

- Standardize PRISM business processes and reports in alignment with enterprise process guidelines and objectives
- Approve/reject process change requests
- Address unresolved business process issues
- Define requirements for The PRISM systems to support business processes
- Define requirements for PRISM metrics and reports
- Maintain accuracy of process documentation
- Champion, optimize and evolve the business processes

Operating Model

- Chair: User Support Group Lead (either SAS and/or MS)
- Meet once a month
 - No more than one hour
 - Decisions made for all agenda items or action items assigned
 - Special meetings called if critical issues surface
 - Attendance and meeting outcomes are tracked and reported to steering committee
- Alternates allowed if appropriate reasons are provided
 - Consistency in alternates critical
 - Alternates must be empowered to represent Board member
 - Respect and accept decisions made by team in the event of absence
- Decisions
 - Made with enterprise benefits perspective
 - By at least a 2/3 majority
 - All must fully support and implement decision outcomes
- PRISM Process Integration Council (PIC) Members
 - Function Directors
 - SAS/NCS User Support Lead
 - RMS User Support Lead

PRISM Change Control Review Board

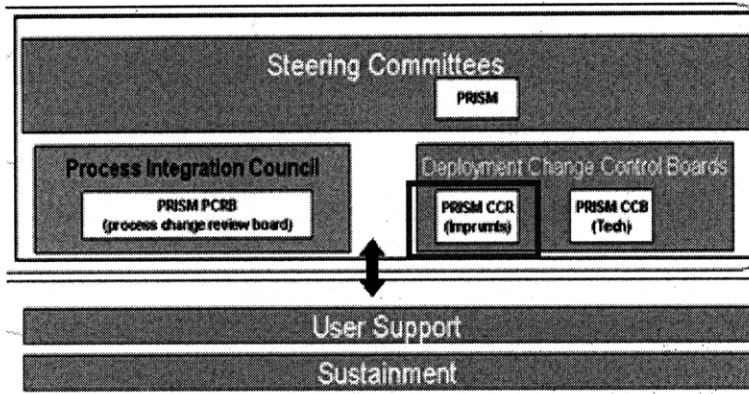


Figure 44. PRISM change control review board

Charter

- Standardize and Optimize Functionality Across All PRISM Functions
- Align PRISM Priorities with SAP Technology Roadmaps
- Approve/Reject Change Requests
- Address Unresolved User Group Issues
- Validate User Group Priorities to Strategic and Technical Roadmaps
- Align solutions to Enterprise Common Business Processes
- Identify Core SAP Solutions to Meet Business Needs

Operating Model

- Chair: Director of SAP Competency Center - Operations
- Meet once a week
 - No more than one hour
 - Decisions made for all agenda items or action items assigned
 - Special meetings called if critical issues surface
 - Attendance and meeting outcomes are tracked and reported to steering committee
- Alternates allowed if appropriate reasons are provided
 - Consistency in alternates critical
 - Alternates must be empowered to represent Board member
 - Respect and accept decisions made by team in the event of absence
- Change Control Review Board (CCRB) Members
 - SAP CC Chair
 - Function Directors
 - SAS/NCS User Support Lead
 - RMS User Support Lead
 - BU IT Liaisons
 - BSEs

PRISM Change Control Board

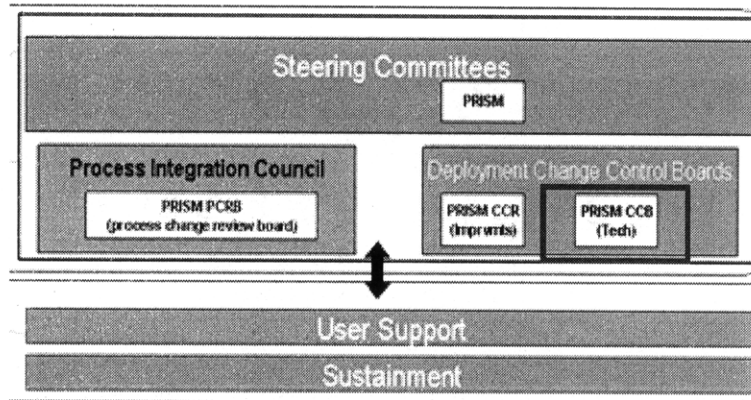


Figure 45. PRISM change control board

Charter

- Manage technical landscape.
- Responsible for configuration control of operating systems.
- Ensure auditable transition of production environment for requested changes.

Operating Model

- Chair: Director of SAP Competency Center - Operations
- Facilitator: IT Liaison
- Meet once a week
 - No more than one hour
 - Decisions made for all agenda items or action items assigned
 - Special meetings called if critical issues surface
 - Attendance and meeting outcomes are tracked and reported to steering committee
- Alternates allowed if appropriate reasons are provided
 - Consistency in alternates critical
 - Alternates must be empowered to represent Board member
 - Respect and accept decisions made by team in the event of absence
- Change Control Board (CCB) Members
 - SAP CC Chair
 - BSEs
 - SAS/NCS User Support Lead
 - RMS User Support Lead
 - BU IT Liaisons

PRISM User Support

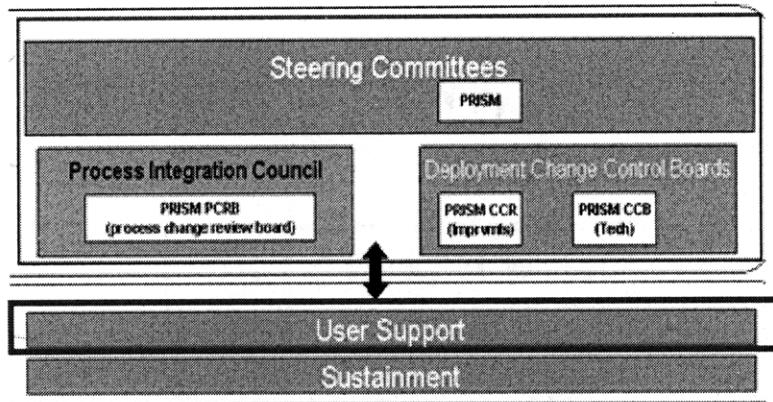


Figure 46. PRISM user support

Charter

- Support user adoption of The PRISM system
- Resolve user issues
- Develop proposal for PRISM improvements
- Implement PRISM changes

Operating Model

- Tier 1: Business Power Users (BPUs) responds to users issues. If cannot be resolved, escalates to tier 2.
- Tier 2: BPUs request for help from Business Process Experts (BPEs), user groups, and/or IT liaisons. If cannot be resolved, escalates to tier 3.
- Tier 3: Business System Experts (BSEs) works with BPUs, BPEs, and IT liaisons as appropriate to resolve issues and submits a TPR to implement solution.
- BPUs and BPEs report to user support group leads
- BSEs report to the SAP competency center
- TPRs and solution records are tracked and reported to SAP CC.
- User Support Members
 - SAS/NCS User Support Lead
 - RMS User Support Lead
 - BPUs
 - BPEs
 - BSEs
 - BU IT Liaisons

PRISM Sustainment

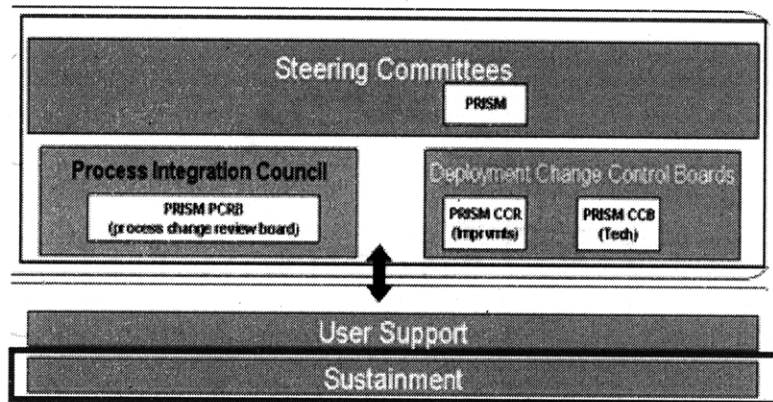


Figure 47. PRISM sustainment

Charter

- Maintain and evolve enterprise PRISM ERP solution
- Facilitate user adoption of system

Operating Model

- Process and Training
 - SAP CC develops and maintains PRISM transaction training materials and train the trainers
 - User support teams develop and maintain business-unique process materials and develops associated training materials
 - User support teams are responsible for delivery training
 - Reporting
 - PIC members define requirements for enterprise metrics and reports
 - User support teams develop metrics and reports
 - PRISM business warehouse (BW) generates reports and data
 - Business unit IT develops user interface systems to extract needed reports
 - Technical infrastructure
 - Technical system architecture, design, and maintenance tasks are performed by the SAP CC
- Sustainment Members
 - SAS/NCS User Support Lead
 - RMS User Support Lead
 - BPU's
 - BPE's
 - BSE's
 - BU IT Liaisons

8.2 Implementation Plan

The implementation plan consists of five phases starting from gaining Raytheon leadership buy-in to team formation, defining financing model, enabling continuous improvement, and roll-out to users.

Phase 1: Obtain Raytheon management approval for proposed governance model and process

- Working team members to brief their management chain and obtain agreement on draft model
- Schedule meeting with Raytheon leadership to gain feedback and approval of proposed governance model
- Once approved, communicate approval of governance model

Phase 2: Form governance structure

- Identify members of the governance structure
 - Enterprise Systems Architecture Integration Board
 - Process Integration Leadership
 - Process Integration Council
 - Process CCRB membership
- Implement CCRB process
- Pilot process with stakeholders
- Develop metrics to assess process effectiveness

Phase 3: Define funding and budget management models:

- Sustaining budget (affordability, accountability, allocation)
- Project investment budget (priorities, affordability, ROI)
- Sustaining budget development for Competency Centers
- Allocation model for sustaining budgets
- Investment model for enterprise systems initiatives (thresholds: minimum/required, desirable, maximum affordable)

Phase 4: Develop mechanism for continuous improvement of governance model and associated processes

- Develop metrics to assess model effectiveness
- Develop feedback and improvement mechanism

Phase 5: Roll-out governance model and process

- Conduct training to users to ensure proper usage of governance model and process
- Add documentation and information materials regarding the improved governance model and process on PRISM website
- Track usage of governance model and process based on identified metrics
- Identify improvement opportunities

8.3 Change Management Plan

The implementation of the proposed architecture requires change management planning to ensure all stakeholders adopt the governance model and contribute to its continuous refinement. Two methods are used to examine change management issues and determine actions. One method is the commitment chart indicating change in commitment status needed to enable the desired functions of the governance model. The other method is capability charting, which indicates the readiness for change and ability to change for each stakeholder.

8.3.1 Commitment Chart

The commitment chart (Beckhard and Harris 1987) in Table 5 is used to indicate the current commitment status and the to-be commitment status of each stakeholder. The commitment statuses are no commitment, let it happen, help it happen, and make it happen. “X” indicates the current commitment status and “O” indicates the desired commitment status. The following chart illustrates the commitment of each stakeholder with respect to the governance model implementation.

Stakeholder	No Commitment	Let it happen	Help it happen	Make it happen
Raytheon Leadership		X →	O	
Raytheon Program Office	X →	O		
SAP CC			X →	O
User Support Group			X →	O
Functional Directors		X →		O
End Users	X →		O	
BU IT Liaisons			X →	O

Table 5. Commitment Chart

Raytheon Leadership currently has a corporate governance model, however, it does not have a structure or decision process at the operational level addressing the PRISM system. Therefore, instead of “let it happen”, the leadership team should commit to supporting the governance model and “help it happen”.

Raytheon Program Office current has no commitment. Most of the decisions on the PRISM system will not directly impact the daily operations of the program office. Therefore, the program office should “let it happen”.

SAP CC is responsible for The PRISM system development, configuration, and maintenance. Members of SAP CC are currently on the working group to develop the governance model. However, in order to enable the governance model, SAP CC needs to “make it happen” by allocating resources, and developing processes to make it work.

User Support Group is an integral stakeholder enabling the governance model. Members of this group attend working group meetings in designing the model, but no dedicated resources have been committed to make this happen.

Functional Directors are critical to making process improvement decisions impacting end users. Currently, the functional directors are not consistently participating in the working group meetings in designing the governance model. This stakeholder group needs to take a proactive role and “make this happen”.

End Users currently are not involved in designing the governance model. However, once the governance model is approved, the end users need to help its execution by complying with the governance process and contribute feedback to its continuous improvement.

8.3.2 Capability Chart

The capability chart (Beckhard and Harris 1987) in Table 6 below indicates stakeholders’ readiness and ability to change. The ratings in this chart are based on interviews and qualitative assessments of the organization.

Stakeholder	Readiness to Change			Ability to Change		
	High	Medium	Low	High	Medium	Low
1. Raytheon Leadership		X			X	
2. Raytheon Program Offices			x			x
3. SAP CC		X			X	
4. User Support Group	x			X		
5. Functional Directors		X		x		
7. End Users			x		X	
8. BU IT Liaisons	x			x		

Table 6. Capability Chart

Raytheon leadership and **SAP CC** are at mid-levels in terms of readiness and ability to change. These stakeholders will be involved in change activities pertaining to governance model implementation; however, years of doing business using previous practices prevents them from being highly ready and able to change.

As for **Raytheon program offices**, as the governance model will not impact them significantly, there is low level of readiness and ability to change.

The **user support groups** and **BU IT liaisons** are responsible for helping users adapt to the system and they are highly ready and able to change in order to enable the governance model to achieve its objectives.

The **functional directors** work within the confines of traditional practices, however, they are willing to change in order to expedite PRISM adoption. They are also highly capable of driving change within their organization.

The **end users** are resistant to change overall as it slows down their daily operations compared to the way they used to work. However, they are able to make changes if needed.

8.3.3 Implementing Change Management

Based on the above analysis, the strong change drivers are SAP CC, user support group leads, BU IT liaisons, and functional directors. These are also members of the governance model working group involved in designing the governance model. In order to enable Raytheon leaders to embrace the proposed governance model, the working group needs to gain buy-in from Raytheon leaders resulting in communications from top-down to implement the proposed governance model. Functional directors have management oversight of the users and can therefore facilitate adoption of the governance model by users.

Based on capability charting analysis, user support group and BU IT liaisons can become the main planners and executors of governance model adoption as they have high readiness to change as well as ability to enable change. Functional directors should be brought onboard to form the process change review board to participate in the governance process. Once the functional directors are involved in governance decisions, they can drive desired user behaviors with respect to PRISM governance. SAP CC may be working under budget and resource constraints, however, they are an integral part of implementing The PRISM system changes. They need to be involved as PRISM change decisions are made. Although most times, Raytheon leadership will not be directly involved in process change decisions, agreed actions may require reinforcement and approval from Raytheon leadership.

An action plan to facilitate adoption of the governance model is as follows:

1. Form PCRFB with functional directors and user support group leads
2. Work with BSEs, BPU, and user support group leads to identify critical process change requests
3. User support group leads facilitates discussions among users, BSEs and BPU to collaboration on addressing the reported issue.
4. Pilot the process change review process with PCRFB to review proposed solution
5. Implement agreed decisions
6. Collect feedback from PCRFB on improving the review and decision process and implement improvement suggestions as needed

The incremental process to utilize the governance model enables participants to try out the governance structure and process and collect feedback along the way. By participating in the creation and refinement of the process, those involved in the governance process will gain sense of ownership and therefore facilitating process adoption as well as empowering them to improve the governance structure and process.

The next chapter discusses overall findings from this thesis research and considerations beyond the governance model to future efforts to mitigate the performance dip and accelerate ROI of The PRISM system.

9 Conclusion and Next Steps

This chapter highlights the key findings and recommendations from this research and identifies additional areas of research.

9.1 Summary of Findings

With the launch of PRISM, Raytheon is on its way to achieve integration with various business groups to enable transparency of operations, and cost-savings throughout the enterprise. Key issues to be addressed to ensure mitigation of the anticipated performance dip and accelerated achievement of ROI include establishing a robust governance structure that can facilitate implementation of new solutions, changes to The PRISM system, and compliance within the user community.

The proposed governance model and process are designed to enabling integration of key stakeholders with the appropriate knowledge of user issues, system functions, and ability to drive change. The governance structure is tiered to enable knowledge transfer and collaboration among governance bodies. The change control boards are designed to enable minimal but comprehensive representation of decision makers to enable just-in-time decision making.

Based on the organization analyses, challenges to implementing the governance model and process include gaining buy-in from Raytheon leadership as well as user communities. The PRISM governance working group is in the process of proposing the PRISM governance model and process to Raytheon leadership. At the same time, it is working with various groups within the governance model to test the established structure and make adjustments as needed as PRISM issues are being reported and addressed post-deployment. Through the user support groups, a critical component of the governance model and the body of functional directors, user communities are being educated on how to report issues encountered during PRISM adoption. The governance model is also designed to facilitate cross-business collaboration enabling continuous improvement of the PRISM system as well as its change control process.

As Raytheon launches towards its “one-company” vision, PRISM will be deployed to additional business units. Therefore, it is essential that the proposed governance model is designed to evolve as more business units are integrated into the PRISM system. The change control board and the process integration council will serve as integration points for additional business units as PRISM deployments are planned for those business units.

9.2 Future Areas of Study

Metrics

The ability to track progress through metrics is an integral part of assessing progress against target objectives. Currently, there are three set of metrics to track PRISM adoption and performance changes: 1) business health metrics, e.g. number of build kits available, 2) system metrics, e.g. number of exceptions or errors by type, 3) performance support metrics, e.g. time to resolve issues, number of issues resolved. These metrics need to be interrelated and tracked accordingly in order to manage performance changes throughout the adoption period. The

metrics are also crucial for managing business customer expectations, ensuring the success of the business. Moreover, deliberate decisions on matrix selection enable Raytheon to measure progress to achieving ROI of PRISM.

Best Practices

Practices in using PRISM, resolving issues, re-using developed solutions, and institutionalizing new processes should be kept in a centralized, accessible body of knowledge area. Establishing best practices requires an appropriate governance structure designed to facilitate development of best practices. The user support groups serving as interface among users, SAP CC, and functional directors are in the best position to gather and promote best practices. As a corporate initiative, a location and organizing group should be established to accumulate best practices and reinforce usage of best practices.

Rewards system is another aspect not easily addressed by Raytheon as the pay structure for each employee is tied to government regulations and contracts. Rewards for employees may not be monetary. Other forms of rewards may be public or peer recognition, enhanced potential for promotion, etc. However, if possible, performance review criteria should be directly aligned with enabling PRISM success and tied to appropriate PRISM metrics.

As Raytheon company continues to advance PRISM adoption, anticipated ROI will be achieved through appropriate usage of governance structure and process and continued initiative to achieve the “one-company” vision by stimulating collaboration and integration within the entire organization.

Acronyms

APEX: Achieving Process, Excellence

ERP system that manages financial data and human resource processes.

BPO: Business Process Owner

The BPO is responsible for business processes. The BPO is typically the functional director.

BPU: Business Power User

Responsible for training PRISM users and addressing user questions and concerns

BRG: Business Readiness Group

This group liaises between program offices and the PRISM team to communicate PRISM updates and gathers PRISM feedback and requirements.

BSE: Business System Experts

This group works in the SAP competency center to configure systems. They are also experts in the functional process. BSEs handle and prioritize user issues.

CCB: Change Control Board

The body of managers and functional directors who decide changes to be implemented into PRISM

CCRB: Change Control Review Board

The CCRB reviews PRISM improvement requests while CCB reviews technical changes.

ERP: Enterprise Resource Planning

Software system that manages end to end business and manufacturing operations

IDS: Integrated Defense Systems

The IDS segment provides ballistic missile defense, including space, air, surface, and subsurface; naval; and maritime and homeland security solutions.

IIS: Intelligence and Information Systems

The IIS segment provides integrated ground systems for signal and image intelligence; weather and climate systems; command and control solutions for air/space platforms; operations, maintenance, and engineering services; and information technology and homeland security solutions.

MS: Missile Systems

The MS segment provides weapon systems, including missiles, smart munitions, projectiles, kinetic kill vehicles, and directed energy effectors.

NCS: Network Centric Systems

The NCS segment provides net-centric mission solutions for network sensors, command and control communications, air traffic management, and homeland security.

PCRB: Process Change Review Board

Governance group consisting of business process owners, or functional directors who decide on process changes and champion agreed decisions.

PIC: Process Integration Council

Governance group consisting of various PCRBs for different Raytheon IT systems.

PRISM: Process Reinvention Integrating Systems for Manufacturing

Raytheon's SAP enterprise resource planning (ERP) deployment, "Process Reinvention Integrating Systems for Manufacturing", or "PRISM" to extend the use of SAP from APEX to a broad, integrated manufacturing operations solution.

ROI: Return on investment

SAP CC: SAP Competency Center

SAP CC is a corporate organization designated to support development, implementation, and maintenance of PRISM SAP ERP system. Raytheon's SAP CC is located in Tucson, AZ.

SAS: Space and Airborne Systems

The SAS segment provides integrated systems and solutions for advanced missions, including surveillance and reconnaissance, precision engagement, unmanned aerial operations, and special force operations and space.

SME: Subject Matter Expert

Responsible for providing input from business process perspective on PRISM implementation and issue resolution

TPR: Test Problems Reported

This is a ticket documenting a PRISM problem or issue reported.

TS: Technical Services

The TS segment specializes in counter-proliferation and counter-terrorism, base and range operations, engineering and manufacturing services, and mission support. It primarily serves defense and government electronics, space, information technology, and technical services and support markets.

Bibliography

Ancona, D., T. Kochan, M. Scully, J. Van Maanen, and E. Westney. *Managing for the Future*. 3rd ed. Mason, OH: Thomson/Southwestern, 2005.

Ancona, Deborah, and Hernik Bresman. *X-Teams: How to Build Teams that Lead, Innovate, and Succeed*. Boston, MA: Harvard Business School Press. 2007.

Beckhard, Richard and Reuben T. Harris. *Organizational Transitions: Managing Complex Change*, Second edition. Addison-Wesley Publishing Company. Reading, MA. 1987.

Brown, C., and I. Vessey, "Managing the Next Wave of Enterprise Systems: Leveraging Lessons from ERP," *MIS Quarterly Executive*, 2(1), 2003.

Galbraith, Jay, Diane Downey, and Amy Kates. *Designing Dynamic Organizations: A Hands-On Guide for Leaders at All Levels*. New York, NY: American Management Association. 2002.

Kaplan, Robert S., and David P. Norton. *Strategy Maps: Converting Intangible Assets into Tangible Outcomes*. Boston, MA: Harvard Business School Press. 2004.

King, W., "Ensuring ERP implementation success," *Information Systems Management*, Summer 2005.

Kates, Amy and Jay R. Galbraith. *Designing Your Own Organization: Using the Star Model to Solve 5 Critical Design Challenges*. San Francisco, CA: John Wiley and Sons, Inc. 2007.

Lean Software Engineering: Essays on the Continuous Delivery of High Quality Information Systems. "Pugh Decision Matrix." [Online] 6 February 2009.
<http://leansoftwareengineering.com/pugh-decision-matrix/>

Miller, Byron, Erin Kinikin and Liz Herbert. "Best Practices: SAP Customer Competency Center," Forrester Research Group, June 8, 2004.

Nightingale, Deborah J., and Alexis Stanke. "Enterprise Value Stream Mapping and Analysis (EVSMA) Release 1.0, Aug 2005.

Nightingale, Deborah J., and Donna H. Rhodes. "Enterprise Systems Architecting: Emerging Art and Science within Engineering Systems," MIT Engineering Systems Symposium, March 2004.

Nightingale, Deborah J., and Donna H. Rhodes., MIT, 2007, *03-Lecture ESD.38J - Holistic Thinking for Enterprise Architecting 02/11/2009*

Portougal, Victor, and David Sundaram. *Business Processes: Operational Solutions for SAP Implementation*. Hershey, PA: IRM Press (imprint of Idea Group Inc (IGI)). 2006. P 81.

Turban et al. *Information Technology for Management, Transforming Organizations in the Digital Economy*. Massachusetts: John Wiley and Sons, Inc., 2008. pp. 300-343. ISBN-13 978-0-471-78712-9

Weill, Peter and Jeanne W. Ross. *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*. Boston, MA: Harvard Business School Press. 2000.

Yusuf, Y., A. Gunasekaran, and M. Abthorpe, "Enterprise Information Systems Project Implementation: A Case Study of ERP in Rolls-Royce," *International Journal of Production Economics*, 87(3), February 2004