

# Process Improvement and Analytics of Commercial Material Substantiation

by

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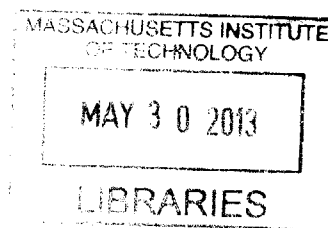
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## **ABSTRACT**

Sikorsky is currently negotiating the SDTA proposal for the CH-53K helicopter. Due to the Truth In Negotiations Act (TINA), when submitting a proposal to the government all suppliers with a total award greater than \$700,000 need to have supporting documentation (material substantiation) showing that pricing is fair and reasonable. This can be accomplished through competition, a cost-price analysis (CPA), or commerciality. Each entity involved in the proposal prefers a different substantiation method: the government prefers CPA or competition, the suppliers prefer commerciality, and Sikorsky prefers competition. Because the government and suppliers have opposing views on commerciality, the government has increased the oversight and complexity of the commercial process. Previously, a proposal's commerciality claims required only a commerciality claim form and an invoice showing that the part had been sold to a commercial entity, but did not require the supplier to provide the commercial invoice price. For the SDTA proposal, an approved commerciality claim required a commerciality form, non-redacted invoices showing pricing information and the customer to which the part was sold, an escalated price analysis to support price reasonableness, a detailed list of modifications to the commercial part, an estimated cost of the modifications, and final commercial end user information. The commercial process involved roughly 90 Sikorsky employees and required roughly 11 months to fulfill all of the government's SDTA commercial requirements. As a comparison, CPA substantiation was completed 4 months prior to commerciality. Reasons for the long cycle time include labor time, a lengthy paper internal approval process including process downtime, lost or misprocessed documents, and insufficient employee training. To combat these inefficiencies, a formalized commercial substantiation process that uses an electronic workspace to provide process control is proposed in this thesis. The formalized commercial substantiation process decreases the required labor hours by an estimated 43%, decreases the internal approval cycle time by 74%, and provides secure document management. These improvements not only benefit the company internally, but also provide external benefits like an increase in government satisfaction which will help Sikorsky attain additional government contracts.

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## **List of Acronyms**

CPA	-	Cost-price Analysis
DMAIC	-	Define, Measure, Analyze, Improve, Control
FAR	-	Federal Acquisition Regulation
PGI	-	Procedures, Guidance and Instructions
SDD	-	System Demonstration and Development
SDTA	-	System Demonstration Test Article
TINA	-	Truth In Negotiations Act

# 1 Introduction

## 1.1 Sikorsky Aircraft Corporation: CH-53K Heavy Lift

Sikorsky Aircraft Corporation (Sikorsky) manufactures an impressive range of aircraft from light, two person helicopters, to heavy lift helicopters, to fixed wing aircraft. This thesis focuses on the CH-53K model which will be the world's premier heavy lift helicopter and a critical component to the Marine's Corps land and sea based logistics <sup>[1]</sup>.

The CH-53K heavy lift helicopter is building upon over 50 years of manufacturing expertise with the CH-53A/D/E predecessors <sup>[1]</sup>. The \$4.4 billion Heavy Lift Replacement development program for 156 aircraft was authorized in December 2005 <sup>[2]</sup>. By December 2012, the program was valued at \$25.5 billion for 200 helicopters <sup>[3]</sup>. There are three phases for the development program: the System Demonstration and Development (SDD) contract, the System Demonstration Test Article (SDTA) contract, and a final manufacturing and delivery phase.

The SDD contract will deliver one aircraft prototype to participate in the ground test program, 4 aircraft prototypes to participate in the flight test program, and two additional airframe ground test articles <sup>[4]</sup>. The airframe ground test articles will undergo a series of structural tests <sup>[4]</sup>. The ground test program aircraft will thoroughly test CH-53K helicopter's rotor blades, transmission, and engines as well as the hydraulic, electrical, and avionics systems while tied to the ground <sup>[5]</sup>. The flight test program aircraft will be used for aircraft handling qualities, performance and propulsion testing, structural analysis and avionics testing, and avionics and mission system testing <sup>[6]</sup>. Once the SDD contract is complete, the development program will phase into the SDTA contract.

Sikorsky is currently negotiating the SDTA proposal for the CH-53K helicopter. The SDTA contract will develop the first 4 of the 200 ordered aircraft <sup>[7]</sup>. The purpose of SDTA is to pilot production and integration processes and to provide aircraft for the Initial Operational Test and Evaluation <sup>[7]</sup>. Initial

Operational Test and Evaluation is the final phase prior to full-rate production and includes testing fully-operational helicopters in typical scenarios that are as realistic as possible <sup>[8]</sup>.

Once the SDTA contract is complete, Sikorsky will begin full-rate manufacturing production with a production plan of 24 aircraft per month <sup>[6]</sup>.

## **1.2 The Problem**

Due to the Truth In Negotiations Act (TINA), when submitting a proposal to the government all suppliers with a total award greater than \$700,000 need to have supporting documentation, or material substantiation, showing that pricing is fair and reasonable. Substantiation can be accomplished through competition, a cost-price analysis (CPA), or a commerciality claim, all of which are completed at the part number level. Competition is completed when two or more suppliers bid on the same part allowing the government to choose the low-cost supplier, and a CPA mathematically determines a fair and reasonable price by using variables such as materials, labor processes, labor skill mix, special tooling, facilities, and other applicable variables. The full commercial item definition listed in Federal Acquisition Regulation (FAR) System Subpart 2.101 is broad. It includes items or parts customarily used by the general public, items not yet sold but have been offered for sale to the general public, items requiring modifications customarily available in the commercial marketplace, items with unique minor modifications for the government, and many services <sup>[9]</sup>. The full Commercial Part definition is provided in Appendix 7.1.

Commercial material substantiation as a category continues to grow in complexity requiring a greater number of resources at Sikorsky. In previous proposals, approving a commerciality claim required a commerciality form and supporting documentation that the part was being sold to a commercial entity. For Sikorsky's SDTA proposal, an approved commerciality claim required a commerciality form, non-redacted invoices, an escalated price analysis from the defense contractor to support price reasonableness, a detailed list of modifications to the commercial part, an estimated cost of the modifications, and final commercial end user information. Sikorsky did not have the resources and processes in place to

efficiently handle the increase in requirements; therefore, the focus of the thesis is to analyze the commercial material substantiation for the SDTA proposal and to develop a tool that will streamline the process for future proposals.

### **1.3 The Hypothesis**

Currently, there is no formalized workflow process for Sikorsky to collect commercial material substantiation and submit to the government. Therefore, I hypothesize that if a defense contractor like Sikorsky defines and implements a documented commercial material substantiation process, the company will benefit from a decrease in labor hours, a decrease in commercial cycle time, and an increase in customer satisfaction. For this thesis, commercial cycle time is defined as the total commercial process time, from outlining commerciality claim approval requirements to obtaining commerciality approval from the government.

### **1.4 Research Methodology**

The DMAIC improvement cycle, a Six Sigma methodology, provides an approach for standardizing the commercial substantiation process. The DMAIC process follows the following five steps: Define, Measure, Analyze, Improve, and Control. By following the DMAIC process, direction and control is brought to the formation of a commercial substantiation process.

Define: The problem is that current commercial substantiation process is burdensome and creates an environment where information is lost, miscommunications are prevalent, and labor is inefficient. These factors cause delays in contract award and loss of customer goodwill, which are important concerns for companies like Sikorsky that rely upon government contracts as a revenue stream.

Measure: To understand the current method for submitting commercial substantiation, the first goal of the internship was to submit all SDTA commercial substantiation to the government and obtain approval for all commercial systems from the government. A record of phone calls, e-mails, and actions to acquire all substantiation, submit to the government, and obtain approval was maintained through the

duration of the internship. Actions taken prior to the internship start date were not well recorded, but the majority of the substantiation was completed during the internship timeframe allowing for the current method to be well documented and understood. The record allows for process inadequacies to be calculated.

**Analyze:** By examining the record of phone calls, e-mails, and actions, the areas for improvement in the current method become apparent. Substantiating the final count of 460 commercial parts required over 1200 e-mails, over 180 phone calls, and more than 90 Sikorsky employees. Analysis is completed on process inadequacies including commercial cycle time, number of lost documents, labor hours, and commercial process downtime.

**Improve:** A formalized commercial substantiation process on a secure electronic workspace is designed to resolve the many improvement areas. Areas of improvement include decreasing the number of substantiation type changes (i.e. parts designated as needing commercial substantiation when the part is not actually commercial), amount of process downtime, internal commercial approval process, decreasing the number of misplaced documents, and unifying status definitions. Key benefits of the electronic submission process are a decrease in Sikorsky labor requirements, a decrease in the commercial cycle time, and an increase in customer satisfaction.

**Control:** The formalized commercial substantiation process is compared to the current method to verify a decrease in labor hours and commercial cycle time. The use of an electronic workspace regulates the process which will maintain labor and time savings.

## **1.5 Thesis Outline**

Chapter 2 provides a background on the current issues with commerciality.

Chapter 3 discusses the current process for commercial substantiation and analyzes the current areas of improvement.

Chapter 4 introduces the formalized commercial substantiation process and the benefits of the new process.

Chapter 5 considers future questions and areas of study that could build upon this internship.

## **2 Current Setbacks with Commerciality**

Commerciality allows defense contracts “to take full advantage of available and evolving technological innovations in the commercial sector” <sup>[10]</sup>. By moving away from items developed exclusively for the government and instead using current technology, the government should in theory reduce contract costs. However, the government is facing the problem that commercial substantiation law does not required the contractor to reveal details on cost which makes it difficult for the government to determine if the item price is fair and reasonable <sup>[11]</sup>. To elaborate, for previous proposals, suppliers only needed to submit a commerciality form and evidence showing that the part had been sold commercially, such as an invoice with a commercial company as the customer. Typically, the supplier would redact all pricing information on the submitted invoice, so the government had limited ways to deduce a fair price for the part. Some methods for determining a fair price are through catalog prices or market research.

Initially, the inability to determine a fair price was less of a concern for the government. But as commercial spending increased from \$20 billion in 2000 to \$75 billion in 2011, solving this problem by amending commercial law gained traction <sup>[12]</sup>. One proposed solution is to limit commercial items to “goods or services that actually have been sold, leased, or licensed in comparable quantities in the commercial marketplace and therefore have prices that clearly are based on competitive market pricing or established catalog prices” <sup>[13]</sup>. Until the law is amended, government contract officers are using the instructions located in the Defense Acquisition Regulations System’s Procedures, Guidance and Instructions (PGI) section 215.4 “Contract Pricing” to obtain sufficient information for price reasonableness determination <sup>[14]</sup>. For the SDTA proposal, sufficient information included invoice prices, a detailed list of modifications and associated costs if applicable, and an escalated price analysis provided

by Sikorsky. When comparing commerciality to competitive or CPA substantiation, the government would prefer that defense contractors use the latter because costs and pricing are more transparent.

Suppliers, on the other hand, prefer commerciality over CPA substantiation. Suppliers prefer commerciality because information like labor rates and production times, which most companies consider proprietary, is not disclosed like with a CPA. In fact, commerciality is so appealing to suppliers that some companies have incorporated it as part of their strategy to make sure all parts meet the commercial item definition. Competitive substantiation as a supplier preference cannot be considered because suppliers have no involvement with defense contractors obtaining competitive bids.

A defense contractor like Sikorsky prefers competitive substantiation because of the three substantiation methods it requires the least amount of time and resources. To satisfy competitive substantiation, the defense contractor must only send the competitive bids to the government. Since most government contracts are “cost-plus” contracts, defense contractors have limited incentive to decrease costs so it is not beneficial for them to determine a fair and reasonable price through CPA or commerciality.

This misalignment between the government, defense contractors, and suppliers is why the government is meticulous when approving commercial claims. However, their meticulousness in acquiring additional information to determine commercial price reasonableness almost caused a delay in the SDTA contract award, with approval granted a few months prior to the award date leaving little time to finish final negotiations with suppliers. With prior proposals requiring only a commerciality form and supporting documentation that the part was being sold to a commercial entity, resources and processes were not and still are not in place to support the increase in substantiation requirements and information requests. Using Sikorsky’s SDTA proposal as a guideline for future requirements, this thesis develops a formalized process that will satisfy the government’s requests while not pressuring the proposal deadline or defense contractors’ labor pools.



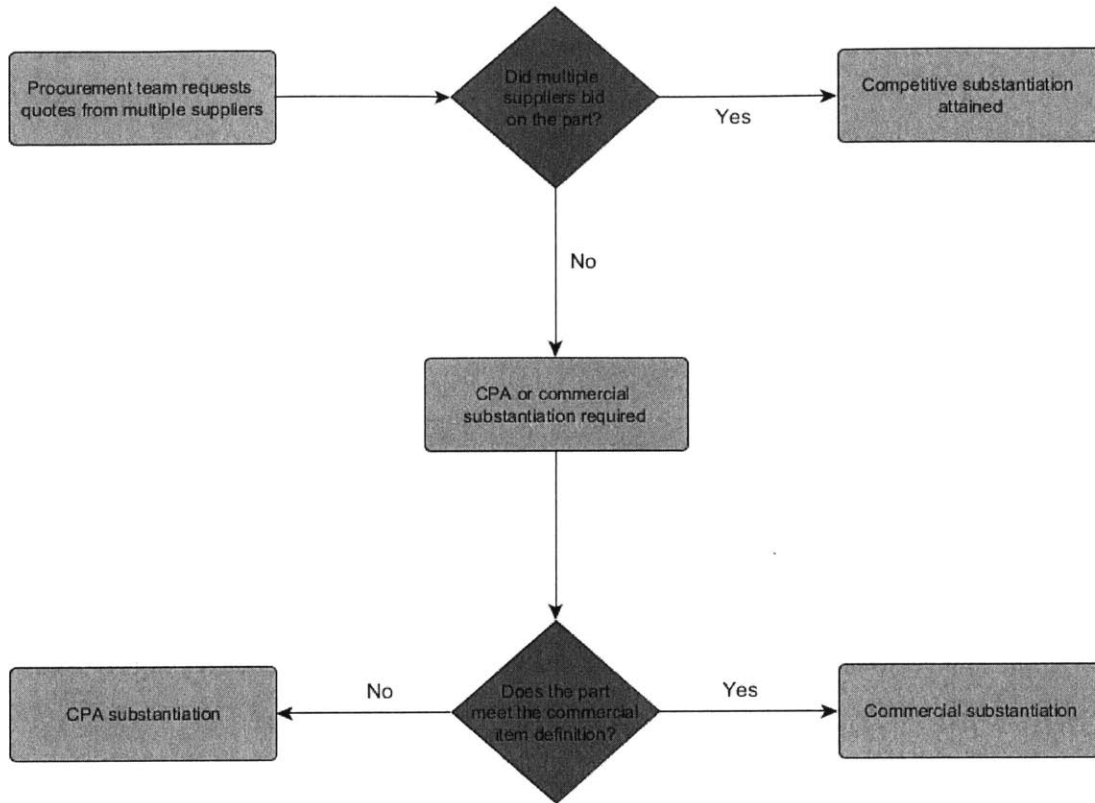
### **3 Research Analysis**

#### **3.1 The Current Commercial Substantiation Method**

##### Creating the Commercial Parts List

In an attempt to attain competitive substantiation, Sikorsky's procurement team requested quotes from multiple suppliers for each part during the SDTA proposal effort. If multiple suppliers bid on the part, Sikorsky could choose the low cost supplier and substantiation was complete. If only one supplier bid on the part, and the part was included in a contract that was over the TINA threshold, then either CPA or commercial substantiation was required.

Once a supplier was awarded a contract, Sikorsky informed the supplier representatives on which parts needed substantiation to support TINA. The suppliers determined whether to use CPA or commercial substantiation on a part-by-part basis, so there were many instances where a supplier used both CPA and commercial substantiation within a single contract to substantiate all of the parts. The choice between CPA and commerciality was determined by the question, does this part meet one of the commercial item definitions listed in the FAR? If not, the company must choose a CPA. For SDTA, the original list of commercial parts was roughly 540 parts. A process map of the procurement and substantiation decisions is provided in Figure 1.



**Figure 1: Flowchart of Substantiation Decisions**

Unfortunately, it is not always simple to determine whether a part meets the current commercial item definition. The current commercial item definition allows parts that have modifications customarily available in the commercial market place or minor unique modifications for government use, and some suppliers use this allowance to make questionable commerciality claims on parts. The allowance of minor unique modifications for government use is the hardest to define. The Commercial Item Handbook provides guidance stating that “minor modification means modifications that do not significantly alter the nongovernmental function or essential physical characteristics of an item or component, or change the purpose of a process” <sup>[10]</sup>. This guidance still leaves discretion upon the individual approving commerciality as to whether the modification “significantly alters” the function or physical characteristics. Both defense contractors and the government use engineers or subject matter experts in the commerciality approval process in an attempt to offset individual discretion.

There is pressure on defense contractors and the government to approve commercial claims because declining the claim leaves few paths forward. Section 15.804 of the FAR prohibits the government from obtaining cost and pricing information to perform a CPA on parts claimed to be commercial <sup>[9]</sup>. Therefore, defense contractors and the government first try to negotiate a fair and reasonable price with suppliers so that the commercial claim can be approved. If the claim is denied, the defense contractor may try to find other suppliers for the part but this path could potentially delay the contract award.

#### Outline Commercial Substantiation Requirements

While determining the SDTA commercial substantiation parts list, Sikorsky Supply Chain Managers and the government agreed on the necessary substantiation to obtain commerciality approval. Required commercial substantiation varies by proposal depending on which government employee is managing the substantiation process, so it is important for the formalized substantiation process to be flexible when assigning substantiation requirements. For the SDTA, every part claimed as commercial was required to submit a commerciality form and two non-redacted invoices showing both the customer and price. For parts with modifications, a list of modifications with associated costs was also required to obtain commerciality approval. Sikorsky Supply Chain Managers then communicated the requirements to each of the Sikorsky Supply Chain Representatives and the commercial Supplier Representatives.

Despite this upfront communication and agreement between Sikorsky and the government, the government added final end user information as necessary information roughly 5 months after the initial agreement and six weeks before the commercial substantiation due date. Final end user information was added because some suppliers were claiming commercial customers that had both commercial and defense organizations, so the government decided it wanted to know the exact aircraft on which the commercial part was being installed and what companies were buying that aircraft.

In addition to final end user information, the government requested an escalated price analysis a week before the commercial substantiation due date as required information. This was an intensive manual process that required Sikorsky employees to comb through over 800 invoices and record the part number, price, quantity, and date into an Excel sheet for each SDTA commercial part. Once all the information had been entered into the Excel sheet, the price for each part number was adjusted by the quantity difference between SDTA and the invoice as well as for the time difference between the SDTA delivery date and the invoice date. Finally, an average price for each part number was calculated and compared to the quoted price from the supplier allowing the government to determine price reasonableness.

#### Supplier Substantiation Submission

Once the suppliers were given the requirements, substantiation was submitted through e-mails to Sikorsky Supply Chain Representatives, Sikorsky Commodity Specialists, or Sikorsky Supply Chain Managers. Once the Sikorsky employees received the substantiation, the information was saved on a personal computer, saved to a shared drive, or forwarded to the Commodity Specialist that was managing commercial substantiation. The reasons for the disorganization were that many Sikorsky employees had not been well trained on the commercial process and the Commodity Specialist role transferred to three different personnel during the process. This unorganized submission process caused lost documents, rework for resubmissions, and delays in approval.

Once the Commodity Specialist received the substantiation material, the information was checked for accuracy. If it was incorrect, the Commodity Specialist notified the appropriate Supplier Representative that the substantiation needed to be updated and resubmitted. Roughly 25% of the parts in the final parts list had incorrect substantiation that had to be corrected and resubmitted. Substantiation was considered incorrect if the commerciality form was not correctly filled in, invoices were redacted, or modification descriptions and costs were not provided (if applicable). If the substantiation was correct, the

Commodity Specialist updated the Excel document that tracked the substantiation status of each commercial part (referred to as the Status Tracker) and saved the substantiation to the shared drive. A filing system on the shared drive at the part number level was created to organize the substantiation.

#### Sikorsky Substantiation Submission

In addition to saving to the shared drive, correct substantiation was e-mailed to the customer. Submitting to the government through e-mail was not reliable since many e-mails with attached documents were blocked by firewall software. To combat this, Sikorsky burned all commercial substantiation information to a disc and sent it to the government monthly. This allowed the government to receive all of the information, but it increased the commercial cycle time by delaying government review.

#### Sikorsky Commerciality Approval

Once all required substantiation had been submitted, the Commodity Specialist could begin the internal Sikorsky approval process. The internal Sikorsky approval process required the paper commerciality form to be signed in the following order: the Supply Chain Representative, the Subject Matter Expert/Engineer, the Chief Procurement Officer, and a Legal Representative. The Supply Chain Representative, the Subject Matter Expert/Engineer, and the Chief Procurement Officer required for approval varied by commercial system, but only one Legal Representative approved commercial claims. Individuals used the supplier submitted substantiation to determine whether or not to approve the part as commercial.

Approval was completed at the part number level. With hundreds of commercial parts on the SDTA proposal, walking or scanning and sending the paper commerciality form to each individual took a significant amount of time. Additionally, using a paper commerciality form during the SDTA proposal caused signed forms to be misplaced and signatures pages to be mistakenly attached to the wrong commerciality form.

Once the commerciality forms were signed for all parts within one system, the Chief Procurement Officer signed a letter indicating that Sikorsky had approved that system as commercial. For the SDTA proposal, this letter template was drafted by the Commodity Manager and went through many review cycles with Sikorsky Legal before the Chief Procurement Officer could sign the letter. The letter was attached to the commerciality form (internal signature page not included) and e-mailed to the government. A copy of both the signed commerciality form and approval letter was saved to the shared drive and the Chief Procurement Officer retained the hard copies.

Even though the government had its own internal approval process, the government would not provide a formal approval until it received notification that Sikorsky had also internally approved the parts as commercial. However, Sikorsky was waiting to receive formal approval from the government before beginning their own internal approval process. This miscommunication caused a two month delay on the commercial cycle time.

#### Commercial Status Communication

Throughout the commercial substantiation process, the Commodity Specialist maintained communication with each supplier by sending weekly status e-mails and calling Supplier Representatives. Status e-mails provided a list of submitted and outstanding substantiation at the part number level. Even with this due diligence, multiple parts in the SDTA proposal had substantiation types changed months into the commercial process. The source for the substantiation type change was difficult to determine, but the error should have been rectified earlier given the detailed and frequent communication.

The Commodity Specialist also communicated with the government weekly to answer any questions and provided status to Sikorsky management. Despite the constant communication on the SDTA proposal, Sikorsky managers and the government each had their own definitions for status updates. For example, one manager considered everything complete if the information had been sent to the government whereas another manager considered everything complete if the information had been

approved by the government. This inconsistency caused confusion between Sikorsky executives and the government and decreased customer satisfaction.

By writing the current commercial substantiation method, it is easier to identify and explain where the pain points are located and why. The next section depicts the current commercial substantiation method as a process map with the steps clearly outlined to provide a better visual of the current process. The escalated price analysis is not included in the process map, however, because it was not incorporated as part of the process but treated as a one-time request.

### 3.2 Process Map of the Current Commercial Substantiation Method

A simplified process map of the current method is provided below in Figure 2. The process map only shows the transfer of hard information, not the many status communications between the Sikorsky Commodity Specialist, Government, Supplier Representatives, and Sikorsky Supply Chain Managers. Steps are numbered on the map and explained below to decrease the amount of information in the figure.

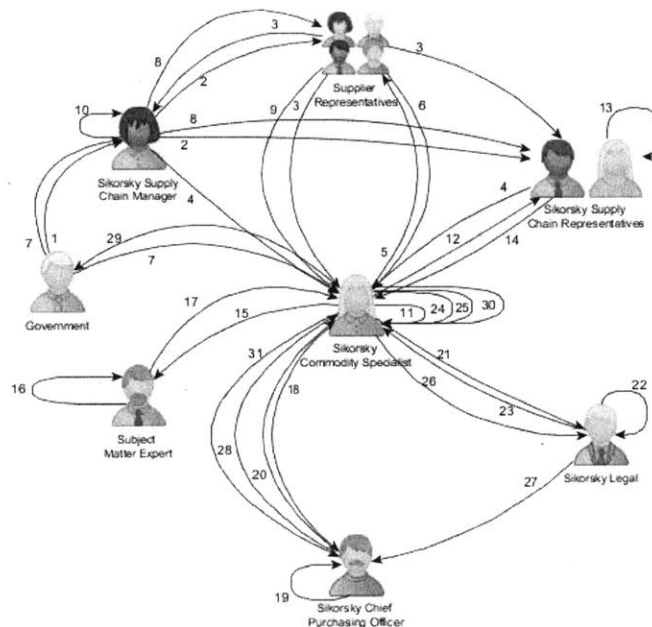


Figure 2: Process Map of Current Substantiation Method

1. The Sikorsky Supply Chain Manager and the Government agree on required substantiation.

2. The Sikorsky Supply Chain Manager communicates the requirements to the Sikorsky Supply Chain Representatives and Supplier Representatives.
3. The Supplier Representatives submit substantiation to the Sikorsky Supply Chain Manager, the Sikorsky Supply Chain Representative, or the Sikorsky Commodity Specialist.
4. The Sikorsky Supply Chain Manager and the Sikorsky Supply Chain Representative forward substantiation to the Sikorsky Commodity Specialist.
5. If the submitted substantiation is incorrect, the Sikorsky Commodity Specialist communicates to the Supplier Representatives that the substantiation must be updated and resubmitted.
6. The Supplier Representatives resubmit substantiation to the Sikorsky Commodity Specialist. Substantiation could also have been submitted to the Sikorsky Supply Chain Managers or the Supply Chain Representatives and then forwarded to the Commodity Specialist.
7. The Government communicates to the Sikorsky Supply Chain Manager and the Sikorsky Commodity Specialist additional required substantiation to gain approval (such as the final end user information).
8. The Sikorsky Supply Chain Manager communicates the additional substantiation requirements to the Sikorsky Supply Chain Representatives and Supplier Representatives.
9. The Supplier Representatives submit additional substantiation to the Sikorsky Commodity Specialist. Substantiation could also have been submitted to the Sikorsky Supply Chain Managers or Supply Chain Representatives and then forwarded to the Commodity Specialist.
10. The Sikorsky Supply Chain Manager creates the Excel Status Tracker and a folder for each commercial part number on a shared drive.
11. The Sikorsky Commodity Specialist files and tracks all correct substantiation at the part number level.
12. When all substantiation for a part is complete, the Sikorsky Commodity Specialist walks the commerciality form and supporting substantiation to the Sikorsky Supply Chain Representative.



13. The Sikorsky Supply Chain Representative reviews the commerciality form and supporting substantiation and signs the commerciality form if approved.
14. The Sikorsky Supply Chain Representative walks the signed commerciality form back to the Sikorsky Commodity Specialist.
15. The Sikorsky Commodity Specialist walks the signed commerciality form and supporting substantiation to the Sikorsky Subject Matter Expert/Engineer.
16. The Sikorsky Subject Matter Expert/Engineer reviews the commerciality form and supporting substantiation and signs the commerciality form if approved.
17. The Sikorsky Subject Matter Expert/Engineer walks the signed commerciality form back to the Sikorsky Commodity Specialist.
18. Because the Sikorsky Chief Purchasing Officer is located in a different building, the Sikorsky Commodity Specialist scans the signed commerciality form and supporting substantiation and e-mails the information to the Sikorsky Chief Purchasing Officer.
19. The Sikorsky Chief Purchasing Officer prints the commerciality form and supporting substantiation, reviews the information, and signs the commerciality form if approved.
20. The Sikorsky Chief Purchasing Officer scans and e-mails the signed commerciality form back to the Sikorsky Commodity Specialist.
21. Because the Sikorsky Legal is located in a different building, the Sikorsky Commodity Specialist scans the signed commerciality form and supporting substantiation and e-mails the information to Sikorsky Legal.
22. Sikorsky Legal prints the commerciality form and supporting substantiation, reviews the information, and signs the commerciality form if approved.
23. Sikorsky Legal scans and e-mails the signed commerciality form back to the Sikorsky Commodity Specialist.
24. The Sikorsky Commodity Specialist saves the approved commerciality form to the shared drive and updates the Status Tracker.

25. Once all commerciality forms in a commercial system are approved, the Sikorsky Commodity Specialist drafts the Approval Letter to send to the Government.
26. Sikorsky Commodity Specialist sends the Approval Letter to Sikorsky Legal for review. The Approval Letter undergoes multiple drafts before it is finalized.
27. Sikorsky Legal sends the finalized Approval Letter to the Sikorsky Chief Procurement Officer.
28. The Sikorsky Chief Procurement Officer signs the finalized Approval Letter and provides it to the Sikorsky Commodity Specialist.
29. The Sikorsky Commodity Specialist attaches the Approval Letter to the commerciality forms for the system (not including the signature pages), scans, and e-mails to the Government.
30. The Sikorsky Commodity Specialist saves the Approval Letter to the shared drive.
31. The Sikorsky Commodity Specialist gives the Sikorsky Chief Procurement Officers the hard copies of the commerciality forms and Approval Letters for their personal files.

### **3.3 Analysis of the Current Commercial Substantiation Method**

The current method leaves much to be improved including commercial cycle time, labor hours, mismanaged documents, changes in substantiation type, consistent status definitions, and training of employees.

#### Commercial Cycle Time

For the SDTA proposal, the commercial cycle time was roughly 11 months. To compare, CPA substantiation was completed 4 months prior to commerciality. Figure 3 below provides a monthly summary of the commerciality process to provide a timeframe reference for important aspects of the process.

<b>Month</b>	<b>Commercial Summary</b>
December	Sikorsky created the part number filing system on the shared drive. Suppliers began to submit commerciality substantiation. Letter requesting required substantiation was sent to specific suppliers from Sikorsky.
January	Suppliers submitted commerciality substantiation. Letter requesting required substantiation was sent to specific suppliers from Sikorsky.
February	Suppliers submitted commerciality substantiation. Letter requesting required substantiation was sent to specific suppliers from Sikorsky.
March	Letter requesting required substantiation was sent to specific suppliers from Sikorsky.
April	Suppliers submitted commerciality substantiation.
May	Letter requesting required substantiation was sent to remaining suppliers from Sikorsky.
June	Suppliers submitted commerciality substantiation. Final end user information requested by the government.
July	Suppliers submitted commerciality substantiation. All substantiation information was due to the government by the end of the month. Escalated price analysis requested by the government.
August	Government conducted an internal review of commercial claims.
September	Government verbally approved commercial systems. The government would not provide a formal approval until Sikorsky also approved the commercial systems. Sikorsky's internal commercial approval process became a priority.
October	Sikorsky's internal commercial approval process continued.
November	Sikorsky completed the internal commercial approval process and received the formal approval from the government.

**Figure 3: Monthly Summary of the Commercial Process**

The 11 month cycle time left only a couple months to finalize contracts with suppliers prior to the contract award date deadline of the end of January. Had the commercial process still been incomplete a couple months later, Sikorsky could have lost the entire SDTA contract. The possibility of losing a contract because one process is inadequate provides motivation for defense contractors to develop a formalized commercial substantiation process.

Reasons for the long cycle time include labor time, process downtime, a lengthy paper internal approval process, changes in substantiation type, mismanaged documents, Status Tracker inaccuracies, and inaccurate employee training. Each of these causes could be mitigated with a formalized commercial substantiation process.

## Labor Hours

The SDTA commercial substantiation process involved more than 90 Sikorsky employees. The roles in the process varied from smaller tasks like Engineers approving commerciality or Supply Chain Representatives collecting substantiation to larger involvements like Supply Chain Managers working with suppliers or Commodity Specialists verifying substantiation. It is estimated that between these 90 employees over 2,300 labor hours were spent on the SDTA commercial process. This equates to roughly 1.4 full-time employees being dedicated to the SDTA commercial process. Appendix 7.2 provides a breakdown of each employee's involvement in the commercial process and estimates the number of labor hours required to approve SDTA commercial claims. Because data collection of the current process began in June and the commercial process commenced in December, not all of the e-mails, phone calls, and actions were collected. Additionally, because only one individual was documenting the current SDTA commercial method, the individual was not able to document all e-mails, phone calls, and actions in which they were not included. Therefore, the 2,300 labor hour estimate could be lower than the actual number of labor hours.

Labor savings can be achieved by decreasing the number of status updates. During the final six weeks before substantiation was due to the government, roughly 60 of the 400 e-mails documented were dedicated to requesting or providing status. This equates to a little less than 1 in 7 e-mails. Not included in this calculation are the bi-daily calls with each supplier, weekly calls with the government, and in-person status requests from Sikorsky managers. The goal for maintaining constant communication was to raise the priority status of commerciality which would hopefully speed up the substantiation submittal process, but it consumed a large amount of time that could have been dedicated to reviewing information or submitting substantiation to the government. Therefore, for the formalized commercial process, it is important to continue to provide status updates but attempt to decrease the time required to do so.

Additional labor savings would be realized if substantiation submissions were organized by part number thus decreasing the time required to process the information. For example, in many received substantiation packages, invoices were not paired with commerciality forms or the two invoices were not next to each other in the stack. The Commerciality Specialist would then have to go through hundreds of papers sheet by sheet to determine what parts had sufficient substantiation. This required a significant number of labor hours that could have been avoided had the information been organized; therefore, the formalized commercial process should have organized substantiation packages.

Sikorsky Internal Approval Process

The Sikorsky internal approval process took roughly 2 months to complete or roughly 18% of the total commercial cycle time. To understand if there is a bottleneck, the signature process for 9 of the 15 SDTA commercial systems is analyzed in Figure 4. Systems were not analyzed if the process had not been tracked or if there were too many commerciality forms in one system to allow an understanding of each individual’s processing time.

System	Approval Processing Time (days)				Downtime (days)	Total Time (days)
	Supply Management Rep	Subject Matter Expert/Engineer	Chief Procurement Officer	Legal		
System 1	1	10	1	9	1	22
System 2	1	1	2	6	1	11
System 3	1	1	1	17	0	20
System 4	1	11	1	24	1	38
System 5	1	1	1	6	2	11
System 6	1	1	1	5	2	10
System 7	1	1	1	15	1	19
System 8	1	1	-	7	0	9
System 9	1	1	3	10	2	17
Average	1.0	3.1	1.4	11.0	1.1	17.6

**Figure 4: Sikorsky Internal Approval Processing Time**

In the chart, one day refers to an individual approval taking 24 hours or less, two days refers to an individual taking from 24 to 48 hours, and so on. Downtime calculates if a day passed between one individual’s approval and the next individual receiving the form. For System 8, the Chief Procurement Officer is not included in the count because the Chief Procurement Officer was not a part of the internal

approval process when the commerciality forms were being signed. The Chief Procurement Officer was added to the internal approval process at the end of August at the request of Legal. Legal requested that the Chief Procurement Officer verify that each commerciality form is properly filled out and signed-off prior to the form being sent to Legal.

The average commerciality form took 17.6 days to be internally approved by Sikorsky. Legal took the largest amount of time at 11 days, or roughly 60% of the total internal approval process time. The reason Legal has a long review period is that all commerciality forms had to be approved by the same Legal representative, whereas the forms were processed by multiple Supply Management Representatives, Engineers, and Chief Procurement Officers. Additionally, Supply Management Representatives and Engineers were familiar with the parts and overall system whereas Legal was not.

For these reasons, Legal has expressed interest in being removed from Sikorsky's internal approval processes. If Legal was removed, then the Chief Procurement Officer could also be removed because they are involved only to prevent improperly signed forms from being submitted to Legal. Removing these two individuals from the process would decrease the review period to 4.6 days (assuming downtime is linearly based on the number of individuals involved in the internal approval process), a 13 day time savings. This large time savings should be incorporated into the formalized commercial substantiation process.

#### Commercial Process Downtime

There were 2 significant periods of downtime in the SDTA commercial process: the delay in beginning Sikorsky's internal approval process and the delay in incorrect information needing to be resubmitted.

As previously discussed, Sikorsky decided to wait until the government had approved all commercial systems before beginning its internal approval process. The reason for delaying the approval process was that Sikorsky did not want to approve a system as commercial if the government rejected it.

Sikorsky also underestimated the time required to complete its internal approval process, initially believing all commercial forms could be signed off within two weeks. In the end, the internal approval process consumed two months. Despite this increase in approval processing time, Sikorsky could have decreased the commercial cycle time if it had eliminated the downtime between receiving a complete commercial substantiation package and beginning the internal approval process. Figure 5 shows the downtime days for the 9 systems that were previously analyzed in Figure 4. The average time between when a commerciality form was received and when the internal Sikorsky approval process began was roughly 122 days, and the average time between when a complete substantiation package was received and the internal Sikorsky approval process began was roughly 46 days. As shown in Figure 4, the average commerciality form took roughly 17.5 days to be internally approved by Sikorsky; therefore, if Sikorsky had started the internal approval process after receiving a complete substantiation package, the two months dedicated to internally approving commerciality could have been eliminated. Therefore, in the formalized commercial substantiation process, the Sikorsky internal approval process needs to begin as soon as a complete substantiation package is received from a supplier.

System	Downtime (days)	
	Commercial Form to Approval Process	Complete Substantiation to Approval Process
System 1	59	58
System 2	249	62
System 3	193	6
System 4	94	57
System 5	74	56
System 6	67	55
System 7	283	47
System 8	5	0
System 9	75	75
Average	122.1	46.2

**Figure 5: Time between Submission and Internal Approval**

If the submitted substantiation was incorrect, the Commerciality Specialist would have to contact the supplier to indicate what needed to be updated and then wait for the information to be resubmitted.

This downtime increased the commercial cycle time. Figure 6 shows that on average it took 20 days for a supplier to resubmit incorrect substantiation. The analysis was performed on a random sampling of 70% of all incorrect submissions. Providing the supplier clear instructions when submitting substantiation can decrease the downtime and should be incorporated in the formalized commercial process.

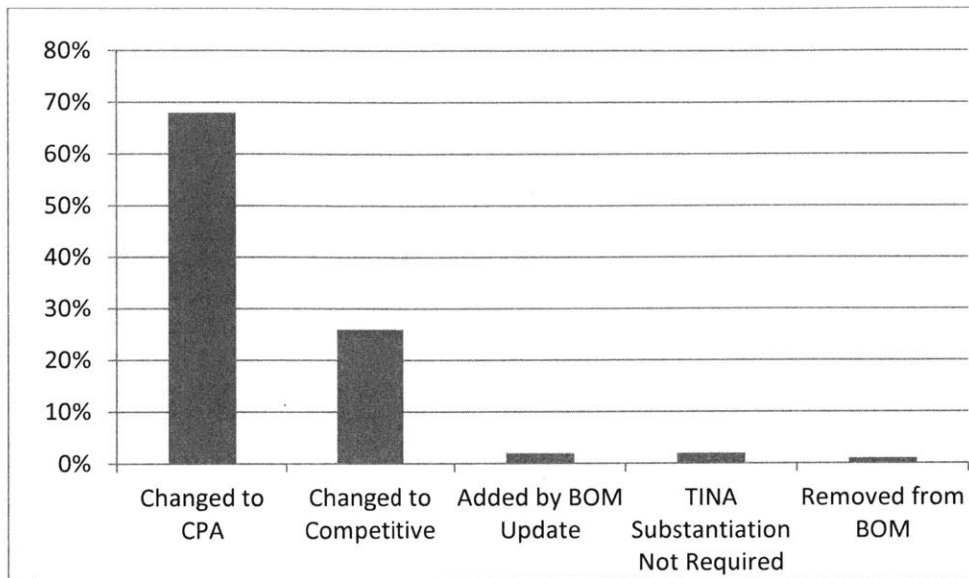
<b>Incorrect Submission</b>	<b>Delta</b>
1	3
2	57
3	42
4	21
5	31
6	7
7	17
8	5
9	3
10	15
Average	20.1

**Figure 6: Downtime for Resubmitting Incorrect Substantiation**

Change in Substantiation Type

Of the 540 plus parts that were considered commercial at the beginning of the SDTA substantiation process, roughly 15% of those parts changed substantiation type leaving a final commercial list of roughly 460 parts. The reasons for the changes in substantiation type are broken down by percentage in Figure 7.





**Figure 7: Breakdown of Substantiation Type Changes**

Almost 70% of the substantiation type changes were commercial-to-CPA. The commercial-to-CPA changes were usually discovered by the supplier reviewing status e-mails and realizing the part was misclassified. All of the commercial-to-CPA misclassifications were discovered after the middle of July, and at this point, time had been wasted dedicating resources to gather information or to manage the substantiation process for these parts.

Roughly 25% of the substantiation type changes were commercial-to-competitive. These changes occurred when a supplier decided that it would honor its SDD contract pricing which was competitively substantiated. Much of this decision was based on the relatively small increase in price compared to the cost to substantiate that price. Similar to commercial-to-CPA misclassifications, these changes were made after the middle of July, resulting in wasted time managing the substantiation process for these parts.

To decrease the number of substantiation type changes, the finalized commercial substantiation process needs to have clearer communication at the beginning of the process and increase supplier interaction when assigning substantiation classification.

### Mismanaged Documents

Document mismanagement includes documents becoming lost or an approval sheet being attached to the wrong commerciality form. In the SDTA proposal, roughly 20 of the final 460 commercial parts, or approximately 4%, had information mismanaged. This does not include parts that had incorrect Status Tracker inputs (Status Tracker indicated the information had been submitted but it could not be located) because it is not known if the information was lost or the input was incorrect; therefore, the 4% includes parts where the information could not be found but the supplier stated the information had been previously provided.

Although the percentage is low, on large multiple aircraft proposals the quantity of documents lost can become additional work and delay approval time. Therefore, the formalized commercial process needs to have one location for submitting substantiation and maintain a submission history.

On the SDTA proposal, there were two cases where an approval sheet was accidentally attached to the wrong commerciality form. Although the mistake was eventually discovered, it took almost 5 months before employees became aware of the issue (commercial cycle time was not affected because Sikorsky had not started its internal approval process). The problem lies with using a paper commerciality form with no location to write in the part number on the signature page. Fortunately, the mistake was discovered before it was submitted for review to the government. Had the document been submitted to the government, the government could become less confident in the contractor's ability to manage the process resulting in possible in-depth investigations and delaying commercial cycle time. The future commercial substantiation method needs to provide a mistake-proof method for approving commercial parts.

### Status Tracker Incorrect

An excel document is not the most mistake-proof method for tracking multiple substantiation items for hundreds of part numbers. On the SDTA proposal, roughly 6% of parts had an incorrect status

stating that information had been submitted when it actually was still outstanding. For a few parts, it was not realized that the status was incorrect until a week before all information was due to the government. Status mismanagement such as this decreases government satisfaction and increases commercial cycle time. The formalized commercial process needs to make submission tracking more automated and less manually intensive to decrease the number of errors.

### Consistent Status Definitions

During the substantiation process, the Program Manager, Chief Purchasing Officer, Supply Chain Manager, and Government all ask for frequent status updates. Unfortunately, each person has their own definitions for status updates. For example, once all substantiation for one system has been provided to the government, the Chief Purchasing Officer and Program Manager consider that system 'Complete' where as the Supply Chain Manager and Government consider that system 'Submitted'. For the Supply Chain Manager and government, the system is not considered 'Complete' until it has been approved as commercial by both the government and Sikorsky.

With multiple different status definitions, a lot of time is wasted at the Sikorsky and government executive meetings to try and understand the current commercial status. Additionally, the misunderstandings can cause finger pointing between the government and Sikorsky as well as between internal Sikorsky groups. Inconsistencies such as these can decrease government confidence and satisfaction; therefore, the future state of the commercial substantiation process needs to have unified status definitions.

### Employee Training

Commercial material substantiation is a process that is well understood by only a few Sikorsky employees. Hence, for the SDTA proposal, Sikorsky created an ad hoc commercial substantiation group to manage the process. Multiple personnel transitioned in and out of this ad hoc group during the proposal effort. By not having a consistent group of individuals managing the process, efficiency decreased

because new personnel need to be trained and updated, and government satisfaction and confidence decreased due to inefficiencies and inconsistencies. Therefore, the future state of the substantiation process needs have trained Sikorsky Supply Chain Representatives and allow them to manage the commercial material substantiation process for their suppliers.

## **4 Tool Development**

### **4.1 A Formalized Commercial Substantiation Process**

The formalized commercial substantiation process will use an electronic workspace to allow documents to be shared over the internet. To begin the process, suppliers will be notified if they are over the TINA threshold of \$700,000 and therefore have to provide substantiation information. Suppliers will then determine which substantiation method to use for each part. A database administrator will provide access to the Commerciality Tool for those suppliers that are claiming commerciality. Other individuals that need access to the Commerciality Tool include Sikorsky engineers, Sikorsky supply chain representatives, Sikorsky supply chain managers, and the government.

When an individual logs into the Commerciality Tool, the Header Page, as seen in Figure 8, will provide the individual with 6 options:

1. Add Commercial Parts: A supplier is claiming commerciality on a new part and it needs to be entered into the system.
2. Edit a Current Commercial List: A part has already been entered into the system but the requirements have changed.
3. Submit Commercial Substantiation: Suppliers submit information to fulfill substantiation requirements.
4. Search: Search for a specific contract/supplier or perform an Advanced Search
5. Summary: Shows the current status for each contract/supplier.

- 6. Supplier Status Notification: Sends an e-mail to each supplier showing their current commercial substantiation status.

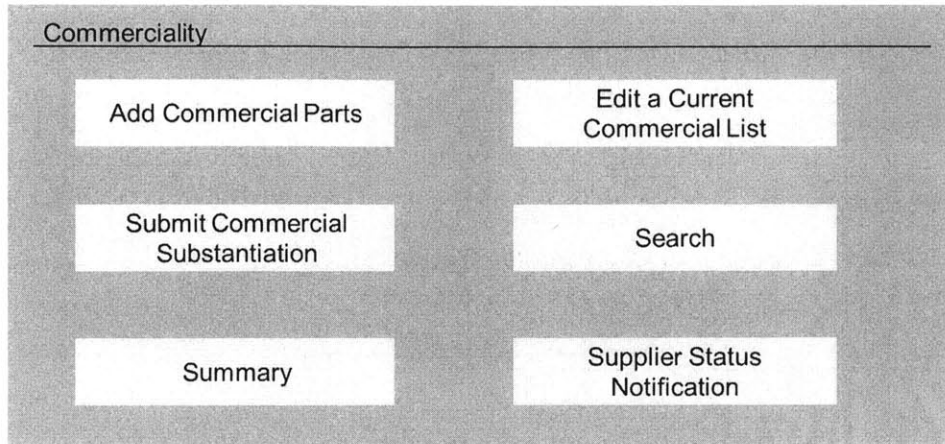


Figure 8: Commerciality Tool Header Page with Six Options

Add Commercial Parts

For suppliers claiming commerciality, the supplier representative inputs the commercial parts into the system. By having the supplier representative input the commercial parts, commercial-to-CPA or commercial-to-competitive changes should decrease because the supplier is choosing its form of substantiation.

 A screenshot of a web form titled "Add Commercial Parts". The form contains several input fields and checkboxes. On the left side, there are fields for "Contract:", "Supplier Code:", "Supplier Name:", "Due Date:", "System:", "SAC Supply Mgmt rep:", and "Part Number:". Each of these fields has a dropdown arrow next to it. To the right of the "System:" and "SAC Supply Mgmt rep:" fields, there is an "Add New" button. To the right of the "Part Number:" field, there is a "+" button. On the far right, under the heading "Req. Substantiation :", there are three columns of checkboxes: "SA6064", "Invoices", and "Other". The "SA6064" and "Invoices" checkboxes are checked, while the "Other" checkbox is unchecked. At the bottom right of the form is a "Submit" button.

Figure 9: 'Add Commercial Parts' Sikorsky View

The screenshot shows a web form titled "Add Commercial Parts". On the left side, there are several input fields: "Contract:" (dropdown), "Supplier Code:" (dropdown), "Supplier Name:" (text), "Due Date:" (dropdown), "System:" (dropdown), "SAC Supply Mgmt rep:" (dropdown), and "Part Number:" (text with a "+" icon). On the right side, there is a "Req. Substantiation:" section with two rows of checkboxes. The first row has "SA6064" (checked), "Invoices" (checked), and "Other" (unchecked). The second row has "SA6064" (checked), "Invoices" (checked), and "Other" (unchecked). A "Submit" button is located at the bottom right of the form.

**Figure 10: 'Add Commercial Parts' Supplier/Government View**

To add commercial parts, the supplier will fill in the fields shown in Figure 9 and perform the following steps:

1. Select the desired Contract in the dropdown menu, such as SDTA. If the contract is not available in the dropdown menu, a Sikorsky employee can add the contract into the tool using the 'Add New' button as shown in Figure 9.
2. Select the appropriate Supplier Code in the dropdown menu which will automatically populate the Supplier Name field.
3. Select the Due Date. All information required from the supplier is required by this date. The due date allows management to easily flag information that is almost due or past due in order to keep the commerciality process on schedule.
4. Select the desired System in the dropdown menu. If the System is not available in the dropdown menu, a Sikorsky employee can add the system into the tool using the 'Add New' button. It is important to file information by system because the government approves commerciality at the system level, not the part number level.

5. Select the Sikorsky Supply Management representative for that system. If the Supply Management representative is not available, a Sikorsky employee can add the Supply Management representative into the tool using the 'Add New' button.
6. Part numbers will be manually entered into the system. Clicking on the plus sign will add an additional part number field. One part number will be entered per field. All part numbers entered will be associated with that contract, supplier, and system. If a supplier has more than one system per contract, this process must be repeated for each system.
7. The system will be hard-coded to require a commerciality form and invoices for all parts claiming commerciality. Other information (such as final end user information) can be added by checking the box at either the system level (requiring this information for all parts in the system) or at the part number level. When adding other substantiation, the individual will be able to provide instructions alongside the requirement. By only requiring the commerciality form and invoices, the Commerciality Tool has a greater level of flexibility. This is necessary because the required substantiation is dependent upon the part; for example, the part may or may not have modifications and modification descriptions are a required to substantiation commerciality.

Figure 11 depicts the 'Add Commercial Items' page after it has been filled in by a supplier representative.

Add Commercial Parts			
Contract:	SDTA		
Supplier Code:	2158963		
Supplier Name:	Supplier A		
Due Date:	08/12/2013		
System:	System A		
SAC Supply Mgmt rep:	Smith, Bob		
Part Number:	5SDF1SDF		
	SDF65SDF		
Other Substantiation: +			
Title		Notes	
Final End User		Provide a statement...	
Modification Description		Details of modifications...	
			Update

Figure 11: Filled In 'Add Commercial Items' Page

Edit A Current Commercial List

To locate the current commercial list to edit, the individual will search by contract, supplier, and system, as seen in Figure 12. This will bring up a view similar to the individual's 'Add Commercial Items' page (remember the page view differs between Sikorsky and non-Sikorsky employees); however, the major difference is that the 'Edit A Current Commercial List' page allows an individual to cancel the entire system as commercial. The reason behind cancelling a list is that during the SDTA contract, a few systems were changed from commercial-to-CPA or from commercial-to-competitive. If a system is changed to 'No Longer Commercial', it will still remain in the system in order to be 'Reinstated as Commercial' as can be seen in Figure 13.



**Edit List:**

Contract: SDTA ▼

Supplier: Supplier A ▼

System: System A ▼

Okay

**Figure 12: 'Edit A Current Commercial List' Search**

**Edit List: SDTA, Supplier A, System A**

Contract: SDTA ▼ No Longer Commercial

Supplier Code: 2158963 ▼

Supplier Name: Supplier A

Due Date: 08/12/2013 ▼

System: System A ▼

SAC Supply Mgmt rep: Smith, Bob ▼

Part Number: 5SDF1SDF ▼

SDF65SDF ▼

Other Substantiation:  **Title**

Final End User

Modification Description

Req. Substantiation:

SA6064 Invoices Other


SA6064 Invoices Other

Notes

Provide a statement... ▼

Details of modifications... ▼

Update



**Edit List: SDTA, Supplier A, System A**

Contract: SDTA ▼ Reinstate As Commercial

Supplier Code: 2158963 ▼

Supplier Name: Supplier A

Due Date: 08/12/2013 ▼

System: System A ▼

SAC Supply Mgmt rep: Smith, Bob ▼

Part Number: 5SDF1SDF ▼

SDF65SDF ▼

Other Substantiation:  **Title**

Final End User

Modification Description

Req. Substantiation:

SA6064 Invoices Other

SA6064 Invoices Other

Notes

Provide a statement... ▼

Details of modifications... ▼

Update

**Figure 13: 'Edit A Current Commercial List' View**

The 'Edit A Current Commercial List' page will also be used if a part number needs to be added or deleted, the Sikorsky Supply Management representative changes due to attrition, or additional substantiation is required for a part or for the entire system.

Submit Commercial Substantiation

After a commercial parts list has been added, the supplier can begin to submit commercial substantiation. This will begin with a search by contract, supplier, and system as seen in Figure 14 in order to bring up the correct commercial substantiation page. The 'Submit Commercial Substantiation' page will have a different view for the Sikorsky employees compared to the government and supplier page view.

The image shows a web form titled "Submit:". It contains three dropdown menus: "Contract" with the value "SDTA", "Supplier" with the value "Supplier A", and "System" with the value "System A". Each dropdown menu has a small downward-pointing arrow on its right side. At the bottom right of the form is a button labeled "Okay".

**Figure 14: 'Submit Commercial Substantiation' Search**

The supplier and government view of the 'Submit Commercial Substantiation' page is found in Figure 15. The 'Submit Commercial Substantiation' page for the supplier and government has the following features:

- Suppliers submit substantiation for each requirement listed under each part number. Instructions are provided under each requirement.
- Once a document has been uploaded, the red X will change to a green checkmark indicating that requirement is complete. By using a red X and green checkmark, an individual can easily determine which requirements are still discrepant.
- The submitted document will be viewable via a hyperlink located under the substantiation requirement. These documents are not able to be deleted in order to maintain a submission history. If another document is uploaded, it is listed above the previous submission but with the nomenclature "SDF65SDF\_SA6064\_v2".
- When a supplier representative is uploading the substantiation, the representative can add a note alongside the submission. This is important if more than one document is uploaded because it allows the supplier representative to explain the differences between the versions.
- The term 'Not Approved' listed under each part number indicates that the part has not been internally approved as commercial by Sikorsky. When approved, a green checkmark will appear to the left of the part number and it will change to 'Approved'.

Submit: SDTA, Supplier A, System A

Part Number: 5SDF1SDF  
Not Approved

Commerciality Form    
Notes: Use the SA6064 form provided

Invoices    
Notes: Submit two invoices with pricing and supplier non-redacted

Part Number: SDF65SDF  
Approved

Commerciality Form    
SDF65SDF\_SA6064\_v1  
Notes: Use the SA6064 form provided

**Figure 15: 'Submit Commercial Substantiation' Supplier/Government View**

The Sikorsky employee view of the 'Submit Commercial Substantiation' page is found in Figure 16. The 'Submit Commercial Substantiation' view for Sikorsky employees is similar to the supplier and government view in the layout and the use of visual cues. Some of the differences in the Sikorsky employee view are:

- The Sikorsky view will have a reset button available next to each requirement. This will be used when the submitted document is incorrect and does not fulfill the requirement. If the reset button is clicked, the green checkmark will change back to a red X. The document will not be deleted however in order to maintain the submission history.
- The Notes field will be editable in case additional information needs to be added such as why the substantiation requirement has been reset.
- The Sikorsky employees can approve the part as commercial. To do this, the Sikorsky Supply Chain or Engineering representative must check the box to indicate their approval. Using the individual log-in information, the system will be able to track who approved the part as commercial. Legal has been removed from the process as requested by Legal, which allows the Chief Purchasing Officer to be removed as well because the Chief Purchasing Officer is only included in the process to aid Legal.

Submit: SDTA, Supplier A, System A

Part Number: 5SDF1SDF

Approve:  Supply Management  
 Subject Matter Expert

Commerciality Form

Notes: Use the SA6064 form provided

Invoices

Notes: Submit two non-redacted invoices

Part Number: SDF65SDF

Approve:  Supply Management James Smith, 11-21-2012 11:21 am  
 Subject Matter Expert Beth Jones, 11-22-2012 12:51 pm

Commerciality Form

SDF65SDF\_SA6064\_v1

Figure 16: 'Submit Commercial Substantiation' Sikorsky Employee View

Search

The individual can perform a high-level search for a contract and supplier or perform an advanced search, as seen in Figure 17. In the advanced search, search fields include Contract, Supplier, Part Number, System, Commerciality Form Submitted, Invoices Submitted, Other Substantiation Required, Commerciality Approved, or Sikorsky Supply Management Representative. For each of these search fields, the individual can select 'All'.

The search function will bring up a view similar to the 'Submit Commercial Substantiation' page. This function was requested by Sikorsky employees because it allows individuals to perform easy comparisons. For example, an individual can search for a specific part number across many contracts to compare submitted substantiation.

**Figure 17: 'Search' Function**

Summary

To pull up a summary view, the individual must search by contract, supplier, and system, as seen in Figure 18. The option of 'All' is available for the supplier and system to get a contract summary.

**Figure 18: 'Summary' Search**

Figure 19 is an example of a 'Summary page' which includes categories such as Supplier, Part Number, Commerciality Form, Invoices, and Other Substantiation. Other categories could be System, Contract, Due Date, or Sikorsky Supply Management Representative. Some of the features of the Summary page include:

- A red X indicates that the requirement has not been fulfilled.
- 'Submitted' indicates that the requirement has been fulfilled.
- A dash under 'Other Substantiation' indicates there is no requirement.
- The 'Export' button will export the information into an Excel sheet.

Summary: SDTA, All, All Export

Supplier	Part Number	Commerciality Form	Invoices	Commerciality Approved	Other Substantiation
Supplier A	5SDF1SDF	Submitted	X	X	-
Supplier A	SDF65SDF	X	Submitted	X	-
Supplier B	652E212	Submitted	X	X	X
Supplier C	AE46123	X	X	X	Submitted
Supplier C	AE95421	Submitted	Submitted	X	-
Supplier C	AD24567	Submitted	Submitted	Submitted	-

**Figure 19: 'Summary' Page**

The 'Summary' page decreases Sikorsky labor and the number of Status Tracker errors by automating the process.

Supplier Status Notification

The 'Supplier Status Notification' page, shown in Figure 20, allows the Sikorsky employee to set up weekly automatic status notification e-mails to be sent to supplier representatives. The Sikorsky employee will select the Contract, Supplier, System ('All' is also an option), and the Sikorsky Supply Management Representative. In the 'To' field, the Sikorsky employee will enter all e-mail addresses for the supplier representatives who will be receiving the notifications. The 'Message' field allows the Sikorsky employee to add in additional information to the e-mail, such as a final substantiation due date. Once all of the information has been added, the Sikorsky employee will click 'Add' to move the information to the table below.

The 'Current Status Notifications' section lists the notification e-mails that are currently being sent to supplier representatives. The actual table may also include Contract, Supplier, System, Recipients, Due Date, Sikorsky Supply Management Representative, and Message, or a 'View' button could be added to the right of the table. The 'Send' button will automatically send a status e-mail which allows for e-mails to be sent out in addition to the weekly auto-generated e-mails. The 'Edit' button allows for the

status notification to be edited, and the 'Delete' button deletes the status notification e-mail which will be used when a supplier has submitted all substantiation.

Supplier Status Notification

Add New:

Contract: SDTA To: bensmith@suppliera.  
 Supplier Name: Supplier A System: All  
 Sik Supply Mgmt: Doe, John  
 Message: Below is the current status for SDTA Commercia Add

Current Status Notifications:

Contract	Supplier Name	System	Send	Edit	Delete
SDD	Supplier A	System C	Send	Edit	Delete
SDTA	Supplier A	All	Send	Edit	Delete
SDTA	Supplier B	System B	Send	Edit	Delete
SDTA	Supplier C	System A	Send	Edit	Delete

Figure 20: 'Supplier Status Notification' Page

The status notification e-mails will have the supplier's status summary (in the same format as the summary page) in the body of the e-mail following the 'Message'. The e-mail allows the supplier to know the exact status of their commercial substantiation thereby decreasing the number of miscommunications. The e-mail should be sent from a global mailbox with the Sikorsky Supply Management Representative copied on the e-mail. By having the automatic status e-mail, Sikorsky saves labor time by not having Sikorsky employees generate and send out status notices.

## 4.2 Omitted from Formalized Commerciality Process

### Commerciality Form

The actual commerciality form is not hard coded into the electronic tool. The reason is that this would require the tool to be updated every time the commerciality form is updated. There are benefits to writing the commerciality form into the system such as the system could require certain fields to be filled in decreasing the number of discrepant forms; but, maintaining greater flexibility with the Commerciality Tool is considered to be a greater benefit than decreasing the number of discrepant forms so the

commerciality form is not hard coded into the system. Once the electronic formalized process has been implemented and if the commerciality process becomes more consistent, the decision to hard code the commerciality form should be revisited as it may make business sense at that time.

#### Escalated Price Analysis

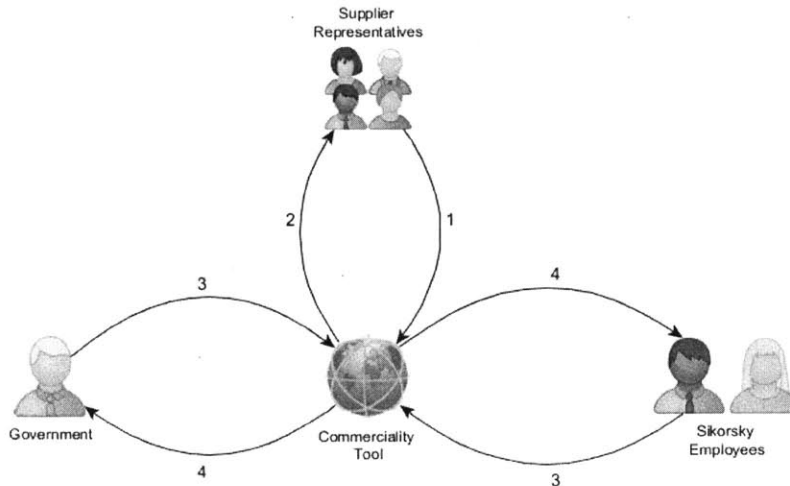
The formalized commerciality process does not include the escalated price analysis for two reasons. First, building in the escalated price analysis into the tool would decrease its flexibility and effectiveness. Suppliers would be required to upload invoices as well as input the variables of the invoice (i.e. the date, quantity, and price) for every part number. Then, the supplier or system would also have to determine the correct escalation rate. Escalation rates are a function of industry history and the part itself, so this can be a difficult choice for the supplier or difficult to code into the system. If the government found even one variable inputted incorrectly, they would more than likely require Sikorsky employees to re-perform the price analysis to verify the system's results which would defeat the whole purpose of coding the price analysis into the system in the first place.

The second reason for not coding the escalated price analysis into the system is that SDTA was the first time the government requested such an analysis for commerciality substantiation. Therefore, there is not much evidence indicating the government will continue to make this request since each commercial substantiation effort has new management. To put in the time and resources to make this a requirement in the system without much indication that the government will continue to want this analysis does not make business sense. Therefore, the escalated price analysis should not be a part of the current formalized commerciality process and remain a one-time effort if the government happens to request the analysis again.

### **4.3 Process Map of the Formalized Commerciality Process**

Figure 21 provides a simplified process map of the formalized commerciality process. Each step is numbered in the picture and a description is provided below.





**Figure 21: Process Map of Formalized Commerciality Process**

1. Supplier Representatives create and edit the commercial parts list and submit commercial substantiation within the commerciality tool.
2. The system will send the Supplier Representatives weekly status e-mails.
3. The Government and Sikorsky Employees can access all information real-time to review commercial substantiation, edit a commercial parts list, view the current status summary, or create a status notification e-mail.
4. The system will export the current status summary to Excel to make it more user-friendly.

#### **4.4 Benefits of the Formalized Substantiation Process**

##### Decrease in Labor Hours

The current commercial substantiation method required roughly 2,300 labor hours or approximately 1.4 full-time dedicated employees for the SDTA proposal. Appendix 7.3 estimates that Sikorsky could see a 43% decrease in labor hours using the formalized process which equated to roughly 1,300 labor hours or approximately 0.8 full-time dedicated employees. Labor hour are saved with the new formalized process for the following reasons:

- Set-up work decreases because defense contractors no longer need to create Status Trackers or a shared drive folder for each part number to save substantiation.
- The supplier creates the commercial parts list which decreases changes in substantiation type because suppliers are better at determining if the part meets the commercial item definition.
- In the formalized process, submissions are organized at the part number level with directions readily available for every requirement. This decreases Sikorsky's labor hours because the substantiation submissions are more organized. The submission process does increase the work for the supplier because, instead of e-mailing a collected document, submissions need to be uploaded at the part number level; however, this increase in initial submission work should be offset by the decrease in rework.
- The number of mismanaged documents decreases because a submission history is available for each part.
- Automating the Status Tracker saves labor because it eliminates Status Tracker errors and time spent maintaining the Status Tracker.
- With employees approving commerciality electronically, time is no longer spent walking and scanning the paper commerciality form.
- The Chief Purchasing Officer is no longer required to write an Approval Letter to the government.
- Status notification e-mails are automated.

Labor savings are important for defense contractors because it saves money and makes the company more competitive, but it is also important to focus on decreasing the overall commercial cycle time.

## Decrease Commercial Cycle Time

Decreasing labor hours is one way to decrease commercial cycle time, but it is also important to focus on decreasing the downtime and decreasing task process time. The formalized commercial substantiation process decreases the downtime by decreasing lost or insufficient substantiation, decreasing the time between receiving a complete substantiation package and the internal approval process, and providing substantiation to the government real-time. Task process time is decreased by creating one channel for submissions and implementing a new internal approval process.

Having incorrect substantiation submissions increases the downtime of the process because Sikorsky must wait for suppliers to update and resubmit the information. Providing clear and visible instructions next to each substantiation requirement, as seen on the 'Submit Commercial Substantiation' page, should decrease the number of incorrect documents and thus decrease the commercial cycle time.

In the current process, it takes Sikorsky roughly 46 days to begin internal approval once a completed substantiation package had been received. The formalized process decreases this time by having the Supply Management Representative begin the approval process as soon a complete package is available. The visual green checkmark cue in the new system makes it easy for the Supply Management Representative to know when a system is ready to begin the internal approval process. Eliminating this 46 day delay will decrease the commercial cycle time.

The current process requires defense contractors to forward substantiation information to the government as well as burn the information to a disc and mail monthly which can delay government review and approval of commercial systems. The formalized process allows the government to view all substantiation information in real-time thereby eliminating the downtime and decreasing the commercial cycle time.

In the current process, suppliers send substantiation to Sikorsky Supply Chain Representatives, Supply Chain Managers, or Commodity Specialists. The unclear submission process increases downtime

because the substantiation is waiting in individual's inboxes instead of being sent directly to the Commerciality Specialist. With the electronic tool, the suppliers will have one location to submit substantiation which will decrease the amount of downtime in the process.

The new internal approval process decreases the average approval time from 17.6 days to 4.6 days by removing Legal and the Chief Purchasing Officer from the process. With the internal approval process taking up almost 20% of the commercial cycle time, this 74% reduction in process time is significant. Including this reduction with the many other commercial cycle time reductions and commercial substantiation should no longer threaten the contract award deadline.

#### Increase in Customer Satisfaction

Increasing customer satisfaction is important for defense contractors because winning government contracts is their main revenue stream. By decreasing labor costs and commercial cycle time with the formalized process, customer satisfaction will increase. Additional ways for defense contractors to increase customer satisfaction are by providing a consistent status and by improving the submission process.

As previously explained, Sikorsky Managers and the government have individual status definitions. What one person calls 'Complete', another will call 'Submitted'. By using the 'Summary' in the Commerciality Tool, defense contractors and the government will be able to understand the current status and communicate clearly. By removing finger-pointing and improving customer communication, customer satisfaction will increase and make defense contractors more competitive.

Improving the submission process will not only decrease costs and cycle time, but it will also increase customer satisfaction. With submissions available real-time, the government will no longer have to wait on defense contractors to provide the information. Additionally, the improved submission organization will make it easier for the government to review and approval commercial system. Each of

these improvements will make the process more painless for the customer, thereby increasing customer satisfaction.

## **5 Conclusion**

The analysis shows that there are many benefits to implementing a formalized commercial substantiation process. The current method causes miscommunications, promotes process errors, increases the commercial cycle time, and increases the labor hours. By using the formalized commercial substantiation process outlined in this thesis, many of these shortcomings are addressed, including a 43% decrease in labor hours, a decrease in commercial cycle time, and an increase in customer satisfaction.

### **5.1 Remaining Questions and Areas of Study**

To make the Commerciality Tool more useful for defense contractors, the tool should be broadened to include CPA and competitive substantiation thus creating a Material Substantiation Tool. By including CPA and competitive substantiation, it can be easily verified that the defense contractor is adhering to all TINA requirements. Additionally, possible overlaps in the different substantiation processes could decrease the defense contractor's labor requirements. For these reasons, defense contractors should be motivated to continue material substantiation process improvement efforts.

With the current tool not including all forms of material substantiation, the effects of the Commerciality Tool must be questioned. With the Commerciality Tool requiring more effort from suppliers than previous commercial claims, will suppliers no longer claim commerciality and instead perform a CPA? The SDTA proposal provided an example of a supplier forgoing profit in order to side-step commercial substantiation. If many suppliers begin to choose CPA over commerciality, what effects will this have on Sikorsky and the time to contract? Effects such as these should be assessed by the defense contractors.

The government's stance on commerciality claims should be determined prior to developing the Commerciality Tool. If the government decides to severely limit the type of commerciality claims, will this decrease the number of commerciality claims to the point where a commercial tool is no longer necessary? If the number of commerciality claims drops substantially, it may make better business sense to continue using a shared drive and Excel Status Tracker instead of investing in an electronic process.

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## 7 Appendix

### 7.1 'Commercial Part' Definition

As defined by the Federal Acquisition Regulation (FAR) System, Subpart 2.101, a commercial part is:

(1) Any item, other than real property, that is of a type customarily used by the general public or by non-governmental entities for purposes other than governmental purposes, and—

(i) Has been sold, leased, or licensed to the general public; or

(ii) Has been offered for sale, lease, or license to the general public;

(2) Any item that evolved from an item described in (1) through advances in technology or performance and that is not yet available in the commercial marketplace, but will be available in the commercial marketplace in time to satisfy the delivery requirements;

(3) Any item that would satisfy a criterion expressed in (1) or (2), but for—

(i) Modifications of a type customarily available in the commercial marketplace; or

(ii) Minor modifications of a type not customarily available in the commercial marketplace made to meet Federal Government requirements. Minor modifications mean modifications that do not significantly alter the nongovernmental function or essential physical characteristics of an item or component, or change the purpose of a process. Factors to be considered in determining whether a modification is minor include the value and size of the modification and the comparative value and size of the final product. Dollar values and percentages may be used as guideposts, but are not conclusive evidence that a modification is minor;

(4) Any combination of items meeting the requirements of (1), (2), (3), or (5) that are of a type customarily combined and sold in combination to the general public;

(5) Installation services, maintenance services, repair services, training services, and other services if—

(i) Such services are procured for support of an item referred to in paragraph (1), (2), (3), or (4) of this definition, regardless of whether such services are provided by the same source or at the same time as the item; and

(ii) The source of such services provides similar services concurrently to the general public under terms and conditions similar to those offered to the Federal Government;

(6) Services of a type offered and sold competitively in substantial quantities in the commercial marketplace based on established catalog or market prices for specific tasks performed or specific outcomes to be achieved and under standard commercial terms and conditions. For purposes of these services—

(i) “Catalog price” means a price included in a catalog, price list, schedule, or other form that is regularly maintained by the manufacturer or vendor, is either published or otherwise available for inspection by customers, and states prices at which sales are currently, or were last, made to a significant number of buyers constituting the general public; and

(ii) “Market prices” means current prices that are established in the course of ordinary trade between buyers and sellers free to bargain and that can be substantiated through competition or from sources independent of the offerors.

(7) Any item, combination of items, or service referred to in paragraphs (1) through (6) of this definition, notwithstanding the fact that the item, combination of items, or service is transferred between or among separate divisions, subsidiaries, or affiliates of a contractor; or

(8) A nondevelopmental item, if the procuring agency determines the item was developed exclusively at private expense and sold in substantial quantities, on a competitive basis, to multiple State and local governments.

## 7.2 Dedicated Full-Time Sikorsky Employee Calculation

Figure 22 lists each Sikorsky employee involved in the commercial process as well as the number of e-mails, phone calls, and actions taken by that individual as a part of the commercial process. Each Sikorsky employee is provided a unique title in order to protect identities.

<b>Nomenclature</b>	<b>E-mail</b>	<b>Phone</b>	<b>Actions</b>
Sikorsky Chief Procurement Officer A	17	0	6
Sikorsky Chief Procurement Officer B	22	0	15
Sikorsky Chief Procurement Officer C	13	0	13
Sikorsky Chief Procurement Officer D	66	1	22
Sikorsky Chief Procurement Officer E	258	30	3
Sikorsky Commodity Analyst	3	0	0
Sikorsky Commodity Manager A	58	7	0
Sikorsky Commodity Manager B	16	0	0
Sikorsky Commodity Manager C	48	3	0
Sikorsky Commodity Specialist A	13	1	0
Sikorsky Commodity Specialist B	6	0	0
Sikorsky Compliance Manager	15	1	1
Sikorsky Contract Specialist A	24	12	1
Sikorsky Contract Specialist B	7	0	0
Sikorsky Contractor A	22	1	30
Sikorsky Contractor B	1046	171	500
Sikorsky Contractor C	16	0	3
Sikorsky Contractor D	4	0	0
Sikorsky Engineer A	12	0	1
Sikorsky Engineer B	2	0	0
Sikorsky Engineer C	3	0	0

<b>Nomenclature</b>	<b>E-mail</b>	<b>Phone</b>	<b>Actions</b>
Sikorsky Engineer D	6	0	1
Sikorsky Engineer E	4	0	1
Sikorsky Engineer F	1	0	0
Sikorsky Engineer G	2	0	0
Sikorsky Engineer H	22	7	5
Sikorsky Engineer I	3	1	1
Sikorsky Engineer J	3	1	1
Sikorsky Engineer K	3	1	1
Sikorsky Engineer L	2	0	0
Sikorsky Engineer M	3	1	1
Sikorsky Engineer N	1	0	0
Sikorsky Engineer O	0	0	1
Sikorsky Engineering Manager A	2	0	0
Sikorsky Engineering Manager B	2	0	1
Sikorsky Engineering Manager C	3	0	0
Sikorsky Engineering Manager D	2	0	1
Sikorsky Engineering Manager E	8	1	5
Sikorsky Engineering Manager F	1	0	0
Sikorsky Engineering Manager G	0	0	2
Sikorsky Engineering Manager H	1	1	2
Sikorsky Engineering Manager I	0	0	1
Sikorsky Engineering Manager J	2	0	0
Sikorsky Engineering Manager K	0	0	1
Sikorsky Executive Assistant	7	0	0
Sikorsky Financial Analyst	11	0	0
Sikorsky Financial Senior Analyst	1	0	0
Sikorsky Legal Representative A	13	1	23
Sikorsky Legal Representative B	147	11	41
Sikorsky Legal Representative C	14	2	0
Sikorsky Legal Representative D	6	0	0
Sikorsky Legal Representative E	13	3	1
Sikorsky Manager - Maryland Office	6	0	0
Sikorsky Product Manager A	1	0	0
Sikorsky Product Manager B	1	0	0
Sikorsky Product Manager C	10	0	0
Sikorsky Program Director	7	0	0
Sikorsky Purchasing Analyst A	31	0	14
Sikorsky Purchasing Analyst B	13	0	5

<b>Nomenclature</b>	<b>E-mail</b>	<b>Phone</b>	<b>Actions</b>
Sikorsky Purchasing Analyst C	27	1	3
Sikorsky Purchasing Analyst D	8	0	5
Sikorsky Purchasing Analyst E	3	0	0
Sikorsky Purchasing Manager A	130	7	1
Sikorsky Purchasing Manager B	7	0	3
Sikorsky Purchasing Manager C	83	3	9
Sikorsky Purchasing Manager D	2	0	0
Sikorsky Purchasing Manager E	2	1	3
Sikorsky Purchasing Manager F	1	0	0
Sikorsky Purchasing Senior Analyst A	50	1	6
Sikorsky Purchasing Senior Analyst B	70	4	16
Sikorsky Purchasing Senior Analyst C	34	0	9
Sikorsky Purchasing Senior Analyst D	2	0	0
Sikorsky Senior Commodity Manager	8	0	1
Sikorsky Senior Contracts Manager	126	15	5
Sikorsky Senior Engineer A	7	0	1
Sikorsky Senior Engineer B	4	1	1
Sikorsky Senior Engineer C	2	0	0
Sikorsky Senior Engineer D	2	0	4
Sikorsky Senior Product Manager A	7	1	0
Sikorsky Senior Product Manager B	2	0	0
Sikorsky Senior Program Manager	234	13	7
Sikorsky Senior Purchasing Manager	2	0	0
Sikorsky Senior Supply Manager	325	43	104
Sikorsky Support Analyst	9	0	1
Sikorsky Support Manager	2	0	0
Sikorsky Vice President A	7	1	0
Sikorsky Vice President B	5	0	0
Sikorsky Vice President C	2	0	0
Sikorsky Vice President D	2	0	0
Total	3188	348	883

Figure 22: Employee Involvement in the Commercial Process

As indicated by the figure, the Sikorsky Contractor B was highly invested in commercial substantiation. Therefore, to estimate the labor hours for the SDTA proposal, Sikorsky Contractor B's labor hours will be calculated separately from the rest of the Sikorsky employees.

#### Sikorsky Contractor B

Contractor B was dedicated to the commercial process from June to November, or roughly 26 weeks. During that time frame, Contractor B spent roughly 2 weeks working on other projects and worked roughly 45 hours per week. Using this top down approach, it is estimated that the Sikorsky Contractor dedicated 1,080 labor hours to the commercial substantiation process.

#### Other Sikorsky Employees

For the remaining Sikorsky employees, labor hours for e-mails, phone calls, and actions are estimated. If an individual wrote or received an e-mail, it is counted towards their total e-mail tally. For this calculation, it is estimated that an individual spent roughly 15 minutes per e-mail sent or received.

Phone calls are tallied similarly to e-mails, and it is estimated that an individual spent roughly 45 minutes per phone call made or received.

Actions are more difficult to estimate. An action could be an individual walking a commerciality form during the internal approval process or an individual spending the entire day working on the escalated price analysis. Due to this large range, the average time was determined for a random sampling of 25% of the other Sikorsky employees' actions. This average time was used to estimate that an individual spent roughly 43 minutes per action.

Due to the difference between the June start date for data collections and the December start date for the commercial process, not all of the e-mails, phone calls, and actions were collected. Additionally, because only one individual was documenting the current SDTA commercial method, the individual was not able to document all e-mails, phone calls, and actions in which they were not included. Therefore, the

labor hours for other Sikorsky employees is increased by 33%. The 33% increase is chosen because the number of hours in the first half of the process was less than the second half so it is not a linear increase.

The labor hours totals for other Sikorsky employees totals to roughly 1,200 hours.

Total Labor Hours

Combining the labor hours of Sikorsky Contractor B and the remaining Sikorsky employees, it is estimated that roughly 2,300 labor hours were dedicated to the SDTA commercial process. Assuming that an average full-time employee works 40 hours per week and 41 weeks of the 11 month commercial cycle time (decreased due to holidays, vacation, and mandatory furlough days), this equates to roughly 1.4 full-time employees.

**7.3 Formalized Process Labor Savings**

The current process record was analyzed to determine which e-mails, phone calls, and actions would not have been required if the SDTA proposal had used the formalized commercial substantiation process. Similar to Figure 22, Figure 23 lists the number of e-mails, phone calls, and actions taken by an individual as a part of the formalized commercial substantiation process.

<b>Nomenclature</b>	<b>E-mail</b>	<b>Phone</b>	<b>Actions</b>
Sikorsky Chief Procurement Officer A	0	0	0
Sikorsky Chief Procurement Officer B	1	0	0
Sikorsky Chief Procurement Officer C	0	0	1
Sikorsky Chief Procurement Officer D	10	0	0
Sikorsky Chief Procurement Officer E	98	19	1
Sikorsky Commodity Analyst	0	0	0
Sikorsky Commodity Manager A	53	6	0
Sikorsky Commodity Manager B	0	0	0
Sikorsky Commodity Manager C	12	3	0
Sikorsky Commodity Specialist A	5	1	0
Sikorsky Commodity Specialist B	6	0	0
Sikorsky Compliance Manager	4	0	0
Sikorsky Contract Specialist A	17	12	0
Sikorsky Contract Specialist B	1	0	0

<b>Nomenclature</b>	<b>E-mail</b>	<b>Phone</b>	<b>Actions</b>
Sikorsky Contractor A	2	1	7
Sikorsky Contractor B	358	49	64
Sikorsky Contractor C	1	0	0
Sikorsky Contractor D	4	0	0
Sikorsky Engineer A	0	0	0
Sikorsky Engineer B	0	0	0
Sikorsky Engineer C	0	0	0
Sikorsky Engineer D	0	0	1
Sikorsky Engineer E	2	0	1
Sikorsky Engineer F	1	0	0
Sikorsky Engineer G	0	0	0
Sikorsky Engineer H	2	0	2
Sikorsky Engineer I	0	0	0
Sikorsky Engineer J	0	0	0
Sikorsky Engineer K	0	0	0
Sikorsky Engineer L	0	0	0
Sikorsky Engineer M	0	0	0
Sikorsky Engineer N	1	0	0
Sikorsky Engineer O	0	0	1
Sikorsky Engineering Manager A	0	0	0
Sikorsky Engineering Manager B	0	0	1
Sikorsky Engineering Manager C	1	0	0
Sikorsky Engineering Manager D	1	0	1
Sikorsky Engineering Manager E	5	0	4
Sikorsky Engineering Manager F	1	0	0
Sikorsky Engineering Manager G	0	0	2
Sikorsky Engineering Manager H	0	0	1
Sikorsky Engineering Manager I	0	0	1
Sikorsky Engineering Manager J	2	0	0
Sikorsky Engineering Manager K	0	0	1
Sikorsky Executive Assistant	6	0	0
Sikorsky Financial Analyst	1	0	0
Sikorsky Financial Senior Analyst	1	0	0
Sikorsky Legal Representative A	2	0	12
Sikorsky Legal Representative B	9	1	0
Sikorsky Legal Representative C	11	2	0
Sikorsky Legal Representative D	4	0	0
Sikorsky Legal Representative E	0	0	0
Sikorsky Manager - Maryland Office	0	0	0
Sikorsky Product Manager A	0	0	0
Sikorsky Product Manager B	0	0	0
Sikorsky Product Manager C	0	0	0



<b>Nomenclature</b>	<b>E-mail</b>	<b>Phone</b>	<b>Actions</b>
Sikorsky Program Director	4	0	0
Sikorsky Purchasing Analyst A	3	0	5
Sikorsky Purchasing Analyst B	2	0	1
Sikorsky Purchasing Analyst C	14	1	1
Sikorsky Purchasing Analyst D	6	0	1
Sikorsky Purchasing Analyst E	0	0	0
Sikorsky Purchasing Manager A	38	3	0
Sikorsky Purchasing Manager B	0	0	0
Sikorsky Purchasing Manager C	36	2	5
Sikorsky Purchasing Manager D	1	0	0
Sikorsky Purchasing Manager E	0	0	0
Sikorsky Purchasing Manager F	1	0	0
Sikorsky Purchasing Senior Analyst A	19	0	3
Sikorsky Purchasing Senior Analyst B	31	4	7
Sikorsky Purchasing Senior Analyst C	20	0	6
Sikorsky Purchasing Senior Analyst D	0	0	0
Sikorsky Senior Commodity Manager	5	0	0
Sikorsky Senior Contracts Manager	44	8	0
Sikorsky Senior Engineer A	3	0	0
Sikorsky Senior Engineer B	1	1	1
Sikorsky Senior Engineer C	1	0	0
Sikorsky Senior Engineer D	2	0	4
Sikorsky Senior Product Manager A	6	1	0
Sikorsky Senior Product Manager B	0	0	0
Sikorsky Senior Program Manager	65	4	1
Sikorsky Senior Purchasing Manager	2	0	0
Sikorsky Senior Supply Manager	153	31	8
Sikorsky Support Analyst	0	0	0
Sikorsky Support Manager	0	0	0
Sikorsky Vice President A	6	0	0
Sikorsky Vice President B	4	0	0
Sikorsky Vice President C	2	0	0
Sikorsky Vice President D	1	0	0
<b>Total</b>	<b>1092</b>	<b>149</b>	<b>144</b>

**Figure 23: Employee Involvement in the Formalized Commercial Process**

To compare the hours required for the formalized commercial process to the current commercial labor hours, Sikorsky Contractor B’s labor hours will be calculated separately from the other Sikorsky employees.

### Sikorsky Contractor B

The difficulty calculating the labor hours using the formalized commercial process is that a top down calculation was to measure the current method's labor hours. To make the comparison, the top down approach is assumed to be proportional to the direct labor hours.

The direct labor hours for the current method are calculated using the same method as the other Sikorsky employee's labor hours. E-mail is assumed to require 15 minutes each, phone calls are estimated at 45 minutes each, and actions are roughly 43 minutes each. These numbers are multiplied by the number of e-mails, phone calls, and actions taken by the Sikorsky Contractor B in Figure 22 and Figure 23. Dividing the number of hours for the formalized process by the number of hours for the current method, it is assumed that the formalized process requires roughly 80% of the labor necessary for the current method. This totals to roughly 900 labor hours for the Sikorsky Contractor B.

### Other Sikorsky Employees

For the remaining Sikorsky employees, labor hours for e-mails, phone calls, and actions are estimated in the same method for the current process. If an individual wrote or received an e-mail, it is estimated that an individual spent roughly 15 minutes per e-mail sent or received. Phone calls are estimated at 45 minutes per phone call made or received, and actions are estimated to take roughly 43 minutes each.

Like the previous labor hour calculation, the labor hours for other Sikorsky employees is increased by 33% due to the difference between the start dates. The labor hours totals for other Sikorsky employees totals to roughly 400 hours. Additionally, almost 25 Sikorsky employees are no longer involved in commercial substantiation using the formalized commercial process.

### Total Labor Hours

Combining the labor hours of Sikorsky Contractor B and the remaining Sikorsky employees, it is estimated that roughly 1,300 labor hours were dedicated to the SDTA commercial process. Assuming that an average full-time employee works 40 hours per week and 41 weeks of the 11 month commercial cycle time (decreased due to holidays, vacation, and mandatory furlough days), this equates to roughly 0.8 full-time employees.