IDENTIFYING INTERNAL BEST PRACTICES AND PROPAGATING STANDARD WORK

By

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B.S. Mechanical Engineering, United States Coast Guard Academy, 2003
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ABSTRACT

Standard work is commonly used in manufacturing and assembly operations to minimize process variation by providing detailed instruction to operators. Internal best practices are processes within the firm that achieve a more beneficial result when compared to alternative existing methods. Standard work is one approach to share best practices, and the challenge is in identifying their existence and effectively capturing the information in written documentation. Best practices are often tacit in nature, being difficult to codify and to put into writing. Effectively finding internal best practices and transferring them from tacit to explicit form as standard work is a desirable objective, improving knowledge transfer and operational efficiency within the company.

There are techniques that can be applied to the standard work development process that increase the likelihood of successful best practice capture and organizational adoption. These techniques are developed and implemented through application at Sikorsky Aircraft, in creating and deploying a system of standard work titled, the “Assembly and Flight Operations Franchise Book.” Major process steps in developing and sustaining standard work include an initial planning phase characterized by an upfront analysis, organizational structuring, and content framework development; and a sustaining phase characterized by a repeating cycle of best practice discovery, documentation, and sharing.

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CHAPTER 1: INTRODUCTION

Overview
Growth in the demand for Sikorsky Aircraft products during the early 2000s led to the need for additional operations capacity. New assembly plants were opened to ensure customers would receive on-time delivery of an aircraft, overcoming constraints in existing facilities. As these new plants were opened, it became apparent that written information regarding operating practices was deficient, and that the company would benefit through the introduction of a documented means to identify, capture, and share best practices. The need for better written documentation was pressing, as the company planned further operations capacity expansion, so a project was initiated to resolve this challenge. The project and associated research led to the hypothesis that there is a definable process that leads to more successful implementation of standard work.

Company Background
Sikorsky Aircraft has a long history of innovation and successful aircraft production. Igor Sikorsky founded the company in 1925, and built its primary manufacturing and assembly capability in Stratford, CT in 1929. With more than eighty years designing and manufacturing aircraft, the company has a significant amount of corporate knowledge on the processes and operations required.

Over the course of the company's history, it has transformed itself into a world class manufacturer of helicopters, its primary focus. Sikorsky serves two main market segments, split between government and commercial products. A significant portion of its manufacturing capacity serves the US government with sales in military products. Products currently manufactured include:

- UH-60M Black Hawk medium-transport helicopter
- HH-60M Medevac helicopters
- S-70 Black Hawk for foreign governments
- MH-60S and MH-60R Seahawk helicopters for the U.S. Navy
- International Naval Hawk
- S-76
- S-92

Company revenues doubled from 2004 to 2008 as a result of significant growth in sales volumes. Demand for H-60 helicopters grew sharply in support of the United States' engagements in Iraq and Afghanistan. In 2007, Sikorsky signed a five-year contract with the US government to provide 537 H-60 helicopters, with a potential value to the company of $11.6 billion. This rapid period of growth significantly increased the company's backlog, stretching its existing manufacturing capacity to the limit.

1 (United Technologies Corporation Annual Report, 2008)
Several new plants were expanded, opened, or acquired over the course of several years to better serve customers and overcome capacity constraints. Capital expenditures grew by 194% in 2007 and 129% in 2008, showing the commitment to expand.

- 2007: Acquisition of PZL Mielec in Poland
- 2007: Florida Assembly and Flight Operations plant begins operations
- 2006: Sikorsky doubles the workforce at the Troy, Alabama, manufacturing site
- 2005: Acquisition of Keystone Helicopter Corporation in Pennsylvania
- 2004: Acquisition of Schweizer Aircraft Corporation in New York

**Problem Definition**

As assembly capacity expanded, it quickly became apparent that written material which identifies company specific procedures, operations, and standards were lacking. Sikorsky wants to ensure a consistent, cost effective, and quality product can be assembled as capacity is expanded to domestic and international plants. This is hindered by the lack of proper documentation, causing multiple problems that need to be addressed:

- Lack of process standardization across different product lines
- Need for additional manpower to train and educate new workforce
- No unified method to capture best practices in the workforce
- Hidden factory effects on production
- Unexpectedly slow learning curves on product lines

The initial focus on improving written documentation was particularly needed in the end stages of the value chain, the Assembly and Flight Operations (AFO) portion of the business, which owns the majority of the expansion. AFO is responsible for the final assembly of helicopters, as well as testing and delivering the product. A strong need exists to guarantee an efficient transfer of knowledge across existing and new plants, capturing the existing hidden factory of knowledge and setting a unified standard.

To use a term coined by Dr. Gabriel Szulanski, Sikorsky realized that its knowledge was “sticky,” or difficult to transfer from one person to another. There are two major components of concern in this “stickiness”: explicit and tacit knowledge. Explicit knowledge can easily be written down, and lends itself well to rules and definitions. Tacit knowledge is difficult to verbally communicate, and is represented by know-how, experience, judgment, insight, and skills. Sikorsky realizes there is a significant amount of tacit knowledge in the workforce, and seeks the means to make some of this information explicit, thereby increasing knowledge transfer and uncovering existing, but unknown best practices.

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2 (Szulanski, 1996)
3 (Rumizen, 2002)
Hypothesis

There is a definable process that enhances the identification, creation, distribution, and sustainment of standard work. This method involves several milestones: an upfront analysis, setting an organizational structure, creating a content framework, developing content, finding the means to share best practices across the organization, and ensuring a sustainable program. This is further simplified in two main phases: planning, the first three listed; and sustaining, the latter three. Using this method, a system of standard work can be created that identifies and standardizes best practices, facilitates cooperation within existing sites, improves the learning curve of new plants, and provides a baseline for future continuous improvement projects.

Research Methodology

The author performed a significant amount of upfront research into the existing situation at Sikorsky to better understand the issues and to define the problem. Academic and industry literature are used to support the hypothesis, generate awareness of additional potential actions, and to identify deviations from existing best practices.

It is interesting to note that a wide range of literature is readily available regarding the topic of knowledge management, but it is somewhat challenging to find information specifically related to standard work. Standard work implementation falls under the general category of knowledge management, but detailed steps that outline standard work programs are sparse. Research into the subject therefore required much linking between general knowledge management theory and actual standard work development.

Introductory Research

Most of the research applicable to this thesis is contained within the body of the document. There are, however, a few useful pieces of information to understand prior to diving into each milestone in the process.

O'Dell and Grayson describe a four phase approach to a successful change process regarding the transfer of best practices⁴. These phases are:

1. Plan – define current and future states
2. Design – outline the roles and functions required
3. Implement – capture information
4. Scale up – share with the organization and sustain

These phases provide a good clear starting point in support of the milestones identified in the hypothesis, even though this thesis simplifies them into only two, planning and sustaining, Figure 1.

⁴ (O'Dell & Grayson, 1998)
Figure 1: Thesis Methodology Compared to O'Dell and Grayson’s Approach

The most significant difference is the inclusion of content development in the sustaining phase in this thesis. This is a result of the cyclical nature of content development as a requirement of sustaining standard work, further developed in chapter 8.

**Thesis Outline**

This initial chapter lays the framework for the paper. The hypothesis identifies six key areas necessary for a successful system of standard work, each of which is given a chapter and is explained in detail. Once each step is understood, the thesis brings them together in the final chapter by identifying the two major phases of the standard work process, planning and sustaining.

Each part of the thesis is identified and defended as follows:

1. Description of the details that constitute and further explain the hypothesis
2. Identification of conditions, circumstances, and actions taken at Sikorsky which support the hypothesis, if applicable

3. Documentation of literature review that supports the hypothesis, as well as discussion of deviations from literature as supported by actions at Sikorsky.
CHAPTER 2: UPFRONT ANALYSIS

Overview

Prior to jumping into the development of standard work, there are several useful upfront analyses that once performed, greatly assist the process. These include defining the need, identifying a change agent, specifying the problem, analyzing the required level of detail and range of options available, and understanding the potential organizational effects.

Defining the need

Standard work is a tool used to minimize variation in process output quantity and quality. It ensures a task is completed in a repeatable fashion, using the same techniques by each process operator. The formal definition of standard work can vary in different applications, and is often used in a general sense to define process guides. This gives it flexibility to be applied across any type of product, operation, or organization as required. The process could be detailed value add activities of an assembly or manufacturing worker, or non-value add activities of support staff; standard work has the potential to impact both.

There must be some need upon which creating a system of standard work is founded. This need may be identified by management, as in the case of Sikorsky, or may be more grassroots in nature, as the workforce recognizes its value. At this stage in the process, the need for standard work may be somewhat vague, and tied to general goals such as better process standardization, or improved workforce learning. This is the foundation upon which the standard work development process commences.

Most organizations make decisions based on financial impact to the firm, and the decision to apply standard work is no different. Standard work impacts many different pieces of the organization, so it may be difficult to show detailed quantitative analysis of the cost savings involved. There are, however, many examples of qualitative reasons to initiate a standard work program:

- No one knows who in the company knows something
- There are repeat or redundant projects
- There is only one person who can do the job
- No one knows what is important among all the data available
- One plant is more effective and efficient than others, yet has the same equipment and number of people

These reasons are all somewhat vague, but they serve to bring a change agent to the issue, who can then better define the underlying issues. In general, these reasons represent the need to codify knowledge into systems and processes in an attempt to remove some dependency on tacit knowledge, transforming processes into a rules-based system.

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5 (Rumizen, 2002)
6 (Davenport & Prusak, 1998)
Sikorsky Aircraft clearly has a need for standard work, but in defining the general problem, has yet to quantify the impact on the organization. In fact, throughout the duration of implementing the new system of standard work at the company, the program was justified qualitatively, with minimal effort involved in analyzing a specific dollar savings objective. At this stage, defining the need for standard work is justifiably qualitative in nature. Standard work implementation need not have a dollar value associated with it to require project initiation\(^7\). Specific quantitative measures are sometimes more appropriate when comparing existing practices and determining which is best in class. This said, tracing the cost of mistakes to specific processes can be documented, providing quantitative evidence that standard work is necessary.

### Change Agent

Understanding that a need exists within the company is not sufficient to initiate a system of standard work. There must be someone within the organization, whether an individual or a team, who can spearhead these initial stages. The change agent “gets the ball rolling”, ensuring the standard work project initiates. They are not necessarily responsible for the outcome, but are a crucial aspect of transitioning the project from a vague need to a company initiative.

The change agent’s job is to realize the need identified in the previous section, and move toward better defining it. Important tasks include:
- Clearly define the need (identifying problem specificity, below)
- Create an initial vision for the end state
- Help manage the setup of organizational structures

The change agent typically assumes a more defined role later, once the standard work organizational structure is in place.

To initiate these tasks, the change agent will require some justification to spending company time and resources. O’Dell and Grayson propose five options to assist the change agent in this process\(^8\):

1. **Identify a compelling call to action**: this should be tied to the need defined in the previous section
2. **A demonstrated success**: show how a specific instance of best practice transfer led or would lead to the desired results
3. **Decentralization and downsizing**: if applicable to the company, leveraging this issue can give urgency to the need to capture information
4. **Benchmarking evidence**: internal (inside the firm) or external (other companies) benchmarking can uncover demonstrated success stories
5. **Recognition of the potential gain**: quantifying the impact

Sikorsky’s change agent is the Assistant General Manager of the Assembly and Flight Operations department, who is also responsible for planning and organizational transformation. In recognizing

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\(^7\) (O’Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)  
\(^8\) (O’Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)
the need for standard work, the change agent discovered the need, and used steps one and four above to better define it. The clear need for knowledge transfer with the expansion of workforce and manufacturing space gave a compelling call to action. Benchmarking evidence added to the case, looking at the successes of companies who have had enormous gains from written documentation, particularly McDonald's franchise approach\textsuperscript{9}.

At Sikorsky, the change agent was in a position of considerable organizational power, though it need not have been the case. Grassroots change agents, starting from the bottom of the organization, can be just as effective, provided they are able to generate enough momentum to prepare the organizational structure. However, a company with a well defined Chief Knowledge Officer (CKO) is more likely to quickly adopt a change agent, particularly if more grassroots in nature\textsuperscript{10}.

**Problem Specificity**

Problem specificity refers to clearly defining why standard work is required, and what it is trying to solve. This is crucial to defining an appropriate level of detail strategy. Misunderstanding the goal could lead standard work development in the wrong direction, creating a system misaligned with the true need. Defining the problem is an iterative process, and may require further consideration throughout the entire planning phase.

Sikorsky Aircraft started with a clear need, though the full reasons behind it required investigation. Standard work is not completely foreign to the company. In fact, existing standard work defines how shop floor manufacturing and assembly employees build the product. Tasks for assembling a helicopter are detailed in the company's Manufacturing Execution System (MES), with step-by-step instructions of the build process. There also exists a system of business processes, which define the requirements, actions, and responsibilities of different parts of the organization. How can it be that two different non-conflicting frameworks for standard work exist, yet efficient knowledge transfer to new plants and across existing assembly lines is missing? The step of problem specificity helps define these reasons, and aligns them later to the appropriate level of detail.

Insight into the organizational culture and company history help define the need, and the reason the new standard work program is initiated. This applies to implementation of standard work in any context. Standard work at Sikorsky has historically fallen under the responsibilities of the Business Process program. If there is a specific need for standard work, an official business process is generated, which becomes a requirement for the company to follow. Generating new business processes is slow, requiring approval throughout the organization. Existing business processes are in place for purchasing, materials logistics, etc: all of which are parts of the organization that do not fall under the responsibility of the Operations department. Operations significantly lacked well documented business processes because of its reliance on the MES tasks. Business processes that

\textsuperscript{9} (Upton, 2005)
\textsuperscript{10} (McKeen & Staples, 2003)
support non-value added support staff roles in Operations were deemed unnecessary with the existence of standard work for value added activities. The need for standard work for other operations business processes, such as planning, industrial engineering, IT requirements, supervisor activities, tool and consumable control, or quality did not become apparent until plant expansion showed a gap in knowledge transfer. This significantly impacted the sharing of best practices, due to the shortage of written documentation.

Had the reasons behind a lack of standard work, as well as an understanding of the existing programs not been fully understood, the standard work formulation and implementation strategy could easily have been error prone. Better defining the problem allowed Sikorsky to ensure its standard work strategy was appropriately aligned with the need. Not aligning this new initiative with the existing ones would cause much wasted effort and inefficiencies.

The process of better defining the problem is the first part of the new standard work program’s development process. Defining the problem leads to a better understanding of why the company is where it is, where the shortcomings are, and what the next steps should be. The new understanding leads to further upfront analysis, and the importance of deciding on a level of detail and range of options.

Level of detail and Range of Options

The level of detail refers to how much information will be included in the standard work, and there are a wide range of options available, as shown in Figure 2. At one end of the spectrum, written documentation can be very detailed, including all information currently known about the process, presented as binding commitments which must be followed without deviation. On the other end, standard work could be more flexible, presented as training guides that can be used for user reference, are not mandatory, and may have general information to allow process flexibility. In general, standard work is thought of more toward the left hand side of the spectrum below, but it is important to point out that any written documentation is better than none, and there may be good reason to choose a more flexible approach, when short timeframes or significant organizational barriers are present.

In the visual representation in Figure 2, the spectrum is identified by the horizontal gray arrow, pointing to either extreme. The black arrow signifies the choice of the firm along the spectrum, with the fading arrows helping to identify the selection process. In the graphic, the Intel Corporation’s famous version of standard work, “Copy Exactly!” is used to represent the most documented and stringent version of standard work\textsuperscript{11}.

\textsuperscript{11} (McDonald, 1998)
Figure 2: Visual representation of the range of options available

It is likely that the right side of this spectrum would contain more tacit knowledge, as a reference guide would be more flexible to the operator. This may not always be the case, but could be an important consideration. Sikorsky's level of detail for new standard work is in the format of a reference guide for two reasons:

1. Attempt to transform more tacit knowledge into explicit form with a flexible approach
2. Overcome organizational barriers inherent with the left side of the spectrum

The amount of information contained in written documentation is independent of the type of standard work chosen. A reference guide could be quite lengthy, while a step by step process is short and succinct. The opposite could be true, where a step-by-step process contains significant information to prevent operations deviations where the reference guide has but a few details. There are different opinions in literature on what level of detail is appropriate. Rumizen describes how written documentation should have only the right info needed by the end user, rather than every piece of information gatherable\(^\text{12}\). Spear, on the other hand, argues that companies that make every piece of information known about a process available will better understand the process and make better decisions\(^\text{13}\). There may not be a correct answer, but it is certainly important for the organization to begin thinking about this level of detail, in preparation for the expected organizational effects. The quantity must be determined upfront, to prevent information and resource overload\(^\text{14}\).

**Organizational Effects**

**Overview:**

*Before an appropriate organizational structure is set up, the change agent should consider the impact of standard work on the organization. There are two general topics to evaluate, the commitment levels necessary and the expected organizational resistance, which are impacted by the organization's natural equilibrium for standard work and the required speed of change. Sufficient planning greatly improves organizational adoption of standard work, and these are important attributes for the change agent to the address.*

\(^{12}\) (Rumizen, 2002)

\(^{13}\) (Spear, 2009)

\(^{14}\) (Jennex & Olfman, 2003)
The Natural Equilibrium

There are two forces at work within the organization with regard to the range of detail, the natural equilibrium and the organization's push against it:

**Force 1:** There exists a theoretical concept of an equilibrium, here related to the type of standard work the organization would naturally have with minimal guidance. Culture and organizational resistance play a major role in shaping this force.

**Force 2:** The organization decides how much "force" it needs or is able to commit to push against the natural equilibrium to achieve the desired end state of standard work.

If the organization decides too soon the level of resources it is willing to commit, it may not be able to break free of the equilibrium.

Each organization has a sort of natural equilibrium for where they would end up on the standard work spectrum with a minimum amount of guidance. An organization that is naturally very structured, with strict guidelines and a product that requires exactness, will likely tend to the left of Figure 2. These organizations naturally prefer clear delineation of responsibilities and processes. By contrast, an organization that "shoots from the hip" to achieve success in a given product, and is less concerned about the how things get done versus the outcome itself, will tend in the opposite direction. This organization prefers a training guide that provides useful techniques to the user, rather than strictures.

Being cognizant of the natural equilibrium is important for the change agent, and is particularly valuable when analyzing the speed of implementation required and the organizational resistance expected. Studies show that the number one greatest challenge to implementing a knowledge management program like standard work is in changing people's behavior\(^\text{15}\). Recognizing this challenge in advance and planning for it is crucial to success, particularly when there may be methods that support the existing equilibrium and still satisfy the need.

Sikorsky's analysis of this natural equilibrium was not part of the upfront planning stages, and thus did not play a role in the initial organizational structure planning. Retrospectively, after going through the process of developing standard work, this stage could have been quite useful. It was unclear from the beginning what the end state would look like, how much level of detail was necessary, or what the organization would naturally respond to. As a result, there was some ambiguity at during the development and planning stages. Understanding the equilibrium would have assisted in identifying what resources would be necessary to get the job done, as well as help define the organizational structure.

The Relationship between Speed of Change and Resource Requirements

The natural equilibrium is an important upfront consideration when recognizing the required speed of change. The need may define a significant urgency to written standard work, where

\(^{15}\) (McKeen & Staples, 2003)
immediate quality gains are required to achieve company performance. When using a minimal amount of resources, the more aligned the planned end state is with the natural equilibrium, the quicker the change will happen. As effort is made to push against the equilibrium, resource requirements increase.

Speed of change refers to the urgency of the need for standard work. If the need is pressing, the organization is likely looking for a near term solution, and there will be a high speed of change. If the need is less urgent, more time will be available to develop standard work and better care and detail can be used.

It is also valuable to compare the urgency of the standard work to the level of detail required, regardless of the natural equilibrium. As previously mentioned, the natural equilibrium is an important consideration, but may not be the desired end state, particularly when significant organizational or cultural change is the goal. Its importance is most notable on its impact on resource requirements. "Resource requirement" is a general term for the number of people, work hours, and materials necessary to achieve standard work. A high resource requirement would indicate a team of people dedicated to the job, where a low resource requirement might be one person initiating the project alone. This is a key step, as expected resource requirements impact the organizational structure and influence organizational resistance.

![URGENCY VS DETAIL AT OR NEAR THE NATURAL EQUILIBRIUM](image)

Figure 3: Resource requirements when at, or near the natural equilibrium
A general guideline of resource requirements is shown in Figure 3 and Figure 4. The more urgent the change, the more resources required; particularly in situations where introducing standard work requires a deviation from the natural equilibrium. In this circumstance more organizational resistance is expected due to the deviation, and more time and effort are required. Low resources suffice if the urgency is low as the implementation takes a longer duration.

Standard work implementation at Sikorsky is urgent and has low resources. To meet the required speed of change, it is appropriate to learn about the natural equilibrium and prepare a standard work strategy aligned with it. Had a deviation from this equilibrium been appropriate, additional resources would have been necessary to support the change.

Aside from urgency, resource commitment is also dependent on whether or not the transfer of knowledge that takes place to capture standard work is facilitated or self directed. A facilitated knowledge transfer is one in which the author of the standard work is not the end user. In this case, someone must learn enough about the process to form their own tacit knowledge on the subject and then make it explicit by writing it down. As a general principle, there is an increased resource requirement for facilitated knowledge transfer as opposed to self directed16. Additional details on transfer techniques are identified in chapter 5.

16 (O'Dell & Grayson, If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice, 1998)
Organizational Resistance

Comparing the need to the existing organizational culture helps qualitatively determine where the natural equilibrium might be. The greater the need, particularly with regards to workforce understanding the need for standard work, the more likely the equilibrium will tend toward the left. However, it seems reasonable to assume most organizations will tend toward the right end of the spectrum, as less effort and resources are required to deploy a training guide than a step-by-step process standard. As such, it is important to think about the expected organizational resistance which will be encountered during implementation of standard work.

Research suggests that the greater the distance between two processes, the less motivation there will be in the workforce in support of knowledge transfer\textsuperscript{17}. Distance is measured both in terms of miles and cultural barriers. This indicates a need for increased resource requirements when writing and deploying standard work in multi-plant environments or when different product lines have different cultural traits.

It is highly likely that standard work will lead to changes in the way many employees do their job. This is in fact the point. Deviations from standard work lead to unexpected results, which lead to varying levels of quality. Since at least some of the workforce will be required to change their current practices, a certain level of resistance to adopting and participating in developing standard work is expected. Taking this into consideration early assists in determining the resources and organizational structures necessary for success. Without considering organizational resistance, implementing change may have the unintended effect of bringing the range of options closer to the right.

Understanding organizational resistance is emphasized by considering the impact of standard work at Sikorsky. The original intent was to provide unified standards for assembly support functions across all plants and product lines. For example: unified shift transitions for supervisors were an expected outcome of written standard work, with a specific process that would be conformed to. Organizational resistance to changing the existing shift transition practices, however, proved too strong, and a unified standard approach could not be documented. Increased organizational commitment and resources would have been required to achieve this level of standardization. The end result of the shift transition standard work is a reference guide for supervisor and manager use, but does not mandate any specific processes. This is still quite useful, and has captured internal best practices even though it is more of a reference guide than the original intent.

This case drives an interesting point, backed up by academic study. Hierarchy based cultures, like Sikorsky, have the lowest likelihood of successful implementation of knowledge management programs compared to other organizational culture types\textsuperscript{18}. Therefore, it is expected that increased organizational resources are required. Conveniently, the best method to address this barrier is

\textsuperscript{17} (Jensen & Szulanski, 2004)
\textsuperscript{18} (Román-Velázquez, 2005)
through codification of information, which is the intent of the company through standard work and the purpose of this thesis.

Summary: Bringing the different upfront analyses all together

Looking at the range of options available may seem like a simple task, but there are many considerations that help lead to a successful standard work program when thought of in advance. Starting with a change agent who can better define the need and start to formulate a vision for the end state, considering the level of detail and organizational effects is the beginning. Sikorsky shows how this can be successful, with an involved change agent who clearly shows a need for standard work in the assembly business.

The upfront analysis identifies a tradeoff between the level of detail, resource commitment, and urgency of standard work. Understanding these factors and planning accordingly allows the organization to overcome the expected organizational resistance. This is particularly crucial when the goal for standard work requires significant push against the natural equilibrium.

A “knowledge asset” is defined as the accumulated knowledge the company has on a narrowly defined topic. They are typically reserved for critical knowledge necessary for firm performance because of the significant time commitment required to develop, document, and sustain. Sikorsky recognized the need for a new knowledge asset through this upfront planning process, one that would clearly describe the operating requirements for a new plant. This knowledge asset is branded the “AFO Franchise Book.” The groundwork for standard work is effectively put in place, a knowledge asset is defined, and the organization is ready to move on to the next step in the standard work implementation process, creating the organizational structure.

\[\text{(Rumizen, 2002)}\]
CHAPTER 3: ORGANIZATIONAL STRUCTURE

Overview:
There are three important pieces to an organizational structure that effectively supports standard work: leadership, project management, and content ownership. All three are crucial to successfully implementing standard work. Additional organizational support structures are also discussed, as well as linking mechanisms and appropriate hierarchies.

Forming the Organizational Structure

An organizational structure is necessary to sustain any work effort. Often, these structures are informal, or not specifically developed over time. They can be an afterthought, or a well planned part of the successful implementation of a project. Similarly, standard work is a product that must have a structure in place to support it, and there are many different ways to think about organizing the company around the program.

There are three important pieces to an organizational structure that best supports standard work: leadership, project management, and content ownership. This structure, represented in Figure 5, is a result of organizational development through standard work implementation at Sikorsky and is backed by literature review. Research into successful organizational structures in support of knowledge capture and transfer suggests there are three types of people necessary: local line leaders, internal networkers and facilitators, and a leader\(^\text{20}\). Similar to the organizational structure at Sikorsky, the "local line leaders" represent the Content Ownership, and the "internal networkers and facilitators" represent the project management.

![Figure 5: Visual representation of the organizational structure.](image)

The three pieces of the organization have different responsibilities, briefly identified:
- **Leadership**: Vision, communicate, enforce
- **Project Management**: Standardize, distribute, track
- **Content Ownership**: Create, educate, verify

\(^{20}\) (Hackett, 2000)
Before detailing the responsibilities of each part of the organization, it is important to understand how the organization forms, whether as a result of informal, unplanned development, or a well thought out process. The change agent identified in chapter 2 plays a large role in the upfront planning, including facilitating the company's decision to prepare an organizational structure that supports standard work. It is difficult to predict the outcome of an unplanned organizational structure that develops on its own, so the change agent must focus on this before efforts are taken to begin the documentation. In fact, the change agent's role transforms at this point, likely developing into one of the three pieces of the new structure.

With the three pieces of the structure in mind, it is worth referring back to the manpower requirements necessary to effectively create standard work. The higher the manpower requirements, the more commitment necessary from each piece of the organizational structure, and the more developed they will need to be.

## Manpower requirements

The number of people involved with standard work is dependent on several factors:

- **The level of detail**: the more detail included in the written documentation, the more people required to capture the information and ensure its accuracy
- **The speed of implementation**: the sooner the standard work is needed, the more people must become involved to hasten its deployment
- **Significance to the organization**: when a large impact on operational performance is expected, the program will be highly visible to upper levels of management, and will require more focus and manpower

These help provide guidance to the number of people required, but in the end, the resource requirement is difficult to quantify. Some level of organizational learning and development is necessary to figure out what level is appropriate given the conditions the company faces.

The leader and project manager require only a small staff to fulfill the work content. McKeen and Staples uncovered that 58% of knowledge managers have one or less staff members working for them\(^{21}\). This may be an indication that knowledge management is something of an afterthought in many companies, but more likely shows that a project manager does not need a large staff to get the job done. Sikorsky's approach justifies this manpower need. Only one leader and one and a half project managers are necessary to effectively run the program. It is the content owners whose scope and level of involvement is a more significant concern, determining how many and how involved they will be.

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\(^{21}\) (McKeen & Staples, 2003)
Leadership

Role of the leader

Effective leadership facilitates organizational adoption of standard work, and choosing a leader to guide the organization improves the chances it will stick. The program is more focused and important to the organization with an involved leadership structure, and it is much more difficult to implement change without leadership's support and backing. Several activities are identified that improve the rate of standard work adoption when given proper attention: vision, communicate, and enforce.

Vision: Define a clear end state for standard work.
The intent of the vision is to help the project manager define the end state of the written documentation. What will it look like? How will the organization get there? What commitment will be required? The leader must play a role in defining these. O'Dell and Grayson argue that this is one of the first things the leader should tackle upon assuming the role. This is the start to endorsing and sustaining learning and transfer of knowledge.

It is best if the vision is developed hand in hand with the project manager, who sees the day to day operating characteristics of the project. The leadership framework at Sikorsky makes this clear: leadership communicates the vision generated by the project manager, which reinforces the decisions the project manager makes and improves organizational buy-in.

Communicate: Share information about the project and spread the vision
Once the organization is committed to writing standard work and identifying best practices, information about the project should be freely shared. This encourages involvement from all parts of the organization and spurs the sharing of existing practices. O'Dell and Grayson suggest that communication by the leader might be the most important aspect of ensuring the success of standard work and give a few examples of ways to communicate include:

- Distributing the vision
- Sharing success stories
- Leading by example (communicating using non-verbal cues)
- Describing how important the project is to the organization

All of these techniques were used at Sikorsky, and they greatly helped spread information about the project. The leader was active in talking about the Franchise Book from the start, and continued to demonstrate its value to the workforce as it progressed. This created an internal demand for the product, greatly facilitating its development and rate of acceptance.

Enforce: Remove barriers to effective deployment of standard work
The greatest effect the leader can have is in reducing the effects of organizational resistance. Providing a clear vision, making it well known that written standard work is a priority, and

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(O'Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)
enforcing standards all contribute to the rate of organizational acceptance. Removing any barriers that stand in the way of the project manager or the project's successful implementation is crucial. The organization will face roadblocks along the way, and a leader with the organizational strength to overcome them greatly improves the chances it will succeed. This is particularly pertinent to overcoming resistance to change. Pushing the organization away from the natural equilibrium is challenging, and having the authority or persuasion to reduce this effect is helpful.

Like any organization, Sikorsky has several barriers to deploying standard work. The most prominent is the lack of upfront involvement by the content owners. Having a leader with the right amount of organizational power, balanced by effective communication, helps keep some engaged, though the challenge still exists. Further leveraging a leader with the ability to assign responsibility throughout the process could prove helpful, as the existing structure does not give the leader enforcement authority over a portion of the content owners.

**Leadership Selection Process**

The change agent who initiates the project may end up assuming the role of the leader, if they are in a place in the hierarchy that supports this decision. The leader must have some ability to make decisions within the organization without needing to consult superiors for approval on every detail. The change agent can often be a senior leader who has recognized the need and started to lay the framework, in which case it is natural for them to assume the official leadership position. This is the case at Sikorsky, where the change agent naturally became the leader because of his role in the organization.

There are two paths for selecting a leader\(^{23}\):

- From within the organization spearheading standard work
- From another department in the company

Rumizen indicates there is no right or wrong answer to this decision, though careful consideration indicates one better than the other depending on the context. When the need is great, causing a quick rate of development, it makes more sense to choose a leader from within the organization. This was the case at Sikorsky, and successfully led to deployment of standard work within six months. Had a leader from outside the organization been selected, there would likely have been some additional delay, as the new leader's credibility within the organization would not have been as strong and would have hindered effective enforcement of the project.

\(^{23}\) (Rumizen, 2002)
Project Management

Role of the Project Manager

A project manager is identified within the organization to carry out the day to day operations of documenting standard work and sustaining the program. The project manager is the "work horse" of the project, particularly in the initial phases. In academic terms, the project manager may be defined as a "knowledge manager," one who is responsible for the knowledge management program. The project manager is a focused type of knowledge manager, concentrating on a specific knowledge asset: the standard work.

The project manager has several roles: prioritizing standard work, establishing a means to communicate best practices, gaining leadership commitment, teaching information seekers (the content owners in particular), putting a process in place to sustain, tracking user satisfaction, and globalizing the knowledge through the company. These are simply described in three goals: standardize, distribute, and track.

Standardize: create the process by which best practices are captured and documented
This is largely the focus of the next chapter, as it is the project manager's responsibility to setup the standard work content framework.

Distribute: make the information available and usable
This includes finding a means to host the information, whether electronically or in hardcopy. Just as important is making sure any written documentation is routinely updated, ensuring its usability. Entering information into the system must be a part of someone's job description, and while the project manager does not necessarily need to be the content author, they are responsible for ensuring it gets done.

Track: monitor progress and communicate throughout the organization
The project manager is the leader's tie to all the details, being aware of all progress and efforts taken to generate standard work. The project manager also continually monitors the progress of content owners in assigning work and building an effective network of standard work supporters, and must be able to move them to action. To translate agreement into action, the program manager must be effective at follow-up activities, communicating routinely with the group.

Project Manager Selection Process

Effective transfer of knowledge is a people-to-people process, and strong relationships are required to ensure accurate information is shared via the correct format. It is therefore critical that the

24 (McKeen & Staples, 2003)
25 (O'Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)
26 (Pfeffer & Sutton, 2000)
27 (O'Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)
project manager have good people skills and be able to communicate effectively. Detailed
knowledge of the company’s manufacturing processes is not a prerequisite for selecting a project
manager, though credibility does go a long way in overcoming organizational resistance. The
Sikorsky project manager began with no process experience in the industry, building relationships
to generate credibility.

There are two traits identified in a study by McKeen and Staples that are found in most knowledge
managers: a willingness to take risks and enjoying the newness of tasks. A project manager with
these traits is more likely be motivated to the job, and thereby more likely to go out of their way to
develop relationships with key stakeholders. The study also shows that of 90% of the knowledge
managers have undergraduate degrees and 60% hold a masters degree, underscoring the benefit of
education as a foundation for the learning required of this role.

Content Ownership

Role of the Content Owners

Of the three pieces of the organizational structure, content ownership is the most variable. The
content owner role can be difficult to define, particularly when some content owners are not
identified until after the standard work program is already in process. Regardless, it is absolutely
critical to identify content owners as soon as reasonably possible. It is very difficult to measure the
quality or effect of standard work if content owners are not identified.

The content owners help define and uncover best practices, support the users, facilitate standard
work delivery, and verify the quality of all documentation. Their three primary responsibilities
are to create, educate, and verify.

Create: uncover new best practices and help define existing ones
At the start, there will likely be several different practices used by different people to complete the
same process. It may be difficult to identify which one is the best practice, and the project manager
will rely on the content owners to help in this identification process. If none of the practices are
worth keeping, it will be up to the content owner to develop new ones with the workforce, whether
as an active role or in a more passive, guiding one.

Educate: teach the workforce how to use standard work
Culture and behaviors are key drivers and inhibitors of internal knowledge sharing. The project
manager makes connections to the workforce during standard work implementation, but relies on
the content owners to make the desired behaviors stick. Much like the project manager is the
leader’s front line eyes and ears, the content owners are the project manager’s front line eyes and

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28 (McKeen & Staples, 2003)
29 (Loshin, 2001)
30 (O’Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)
ears. The content owners must stay active in spreading the knowledge and ensuring the workforce is using the new standard work developed.

Verify: ensure the accuracy
The project manager cannot know everything about the processes identified in standard work, and relies on the content owners to verify its accuracy. The content owners should be in a position to make themselves experts in the field, if they are not already. They continually review the documents, as out of date information significantly hinders standard work usage.

Content Owner Selection Process

There are many issues involved with selecting someone to "own" a process, best practice, or standard work. Processes that cross several organizational competencies, those with particularly high value, and corporate bureaucracy are a few examples of issues that complicate the ownership selection process. The project manager works hand in hand with the leader to identify content owners in an effort to minimize organizational backlash associated with these challenges.

There are two techniques for selecting content owners. The first is that each best practice or business process which is included in standard work has an identified content owner. This can be onerous, depending on the scale of the project, as hundreds of content owners are required. The second, more reasonable approach is to identify content owners for the main organizational competencies. This generally leads to content owners selected solely by their place in the organization, rather than their knowledge of a particular process, but is more manageable for the project manager.

Content owners are identified at Sikorsky based on a combination of the methods above. The first consideration is hierarchal standing in the company, so a manager in charge of planning is the content owner for the planning sections of the standard work. When multiple parts of the organization have a stake in the process, or when the process is repeated by several people, the project manager and leader work to identify a best fit content owner, one with particular desirable traits, such as a willingness to become involved in the standard work process.

Organizational Hierarchy

Hierarchy in the organization is generally predefined, particularly in hierarchically-based cultures like Sikorsky. The challenge arises when some hierarchy structures inhibit action. For example, the project manager or content owners may not report directly to the leader, making enforcement difficult. To mitigate this risk, responsibilities of each part of the organizational structure in support of standard work are laid out to ensure redundancy of activities and prevent single points of failure. Nonaka describes how overlapping responsibilities encourages frequent

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31 (Loshin, 2001)
communication\textsuperscript{32}, and this can help overcome these hierarchy barriers. All three pieces of the structure communicate the vision, identify best practices, and share the system with the organization.

Industry suggests that forming connections to a Chief Knowledge Officer (CKO) may be an additional source of support. One in five Fortune 500 companies have a CKO or equivalent, indicating the value placed in knowledge management roles\textsuperscript{33}. Forming a strong relationship with the CKO helps the upfront learning process, as extra guidance is be available to learn about potential barriers and existing success stories. Linking mechanisms like this are useful in approaching challenges caused by the organization’s hierarchy.

**Organizational Linking Mechanisms**

Each piece of the organizational structure is tied to the other, hence the double sided arrows in Figure 5. There must be linking mechanisms between the three that allow for communication and information flow. These could range in the level of commitment necessary, such as weekly meetings or ad hoc round tables between the project manager, content owners, and leader. Rumizen recommends forming a steering committee to add formal guidance and decisions to the process\textsuperscript{34}. Different organizations require different linking mechanisms, but it is important to consider them early, as they are difficult to change or adopt after the process has started.

Organizational linking at Sikorsky was largely through ad hoc meetings and relationships built by the project manager. While this did have good effect, a more formal structure would have been appropriate. It was difficult to generate agreement among content owners for several aspects of the standard work, including the level of ownership and responsibilities of each party. Creating a means to tie the leader and content owners together using stronger linking mechanisms could have helped.

**Summary: A Holistic View of the Organization**

Success of standard work is initiated through the upfront analysis and the change agent, and is supported through the formation of organizational structures. Formally identifying the leader, project manager, and content owners, is the first step to setting up an official framework to house standard work. These organizational structures will support and guide the formation of standard work, guiding it from the development stages to everyday workforce use.

Picking the right people for the job is absolutely critical, as building trust and relationships among the workforce is necessary to lead to the organizational transformation involved with standard work. Those selected must be tied together with methods to communicate; allowing them to

\textsuperscript{32} (Nonaka, 1987) \\
\textsuperscript{33} (McKeen & Staples, 2003) \\
\textsuperscript{34} (Rumizen, 2002)
establish a rules-based system for an effective content framework. Evaluating this structure's fit into the overall organization, building on existing structures is a natural starting point, but should not limit the potential for new ways of supporting standard work.
CHAPTER 4: STANDARD WORK CONTENT FRAMEWORK

Overview:
Developing a framework for standard work content is the first step towards codifying tacit knowledge. A content framework is crucial to adequate preparation for finding and documenting the best practice. The content framework defines what the end product looks like, branding the standard work program, and defining “best practice.” Forming an effective team to execute standard work and defining the role of Information Technology tools are both used to achieve these goals.

Understanding Tacit Knowledge

The content framework is largely the responsibility of the project manager. The project manager completes all groundwork activities that lead up to the actual capture and documentation of existing knowledge and best practices. Before developing a content framework however, it is important to first understand tacit knowledge.

As standard work systems are developed, managers often have inaccurate views of how knowledge is used in people’s jobs, and rarely acknowledge the tacit transfer of information. Pfeffer reasons that 70% of all learning is informal and unplanned. Simply recognizing this fact ahead of time will help the project manager develop a more robust content framework, seeking the means to understand and capture this important piece of the existing knowledge.

Quantifying and making tacit information into an explicit form is one of the primary intents of standard work. As the framework develops, it is important to prepare a format and technique that encourage capture of this tacit knowledge. It is easy to capture only the mechanics of a process, leaving out important details; proper planning is necessary to prevent over-reliance on “easy” knowledge captured.

It is also useful to acknowledge that it takes time to develop new information gathered into the form of tacit knowledge. After seeing, doing, and reading, the user must digest the sum of the information learned, making it tacit. This suggests that the process of creating standard work should focus on capturing existing information, rather than make an attempt to form a new best practice that lacks both tacit and explicit knowledge. If no best practice exists, it is worth capturing and understanding the existing practice rather than trying to head straight to the best practice.

Defining “Best Practice”

The term “best practice” is widely used in industry and can have different meanings in different applications. Best practice could mean:

- The best we can do, no improvement necessary

35 (Pfeffer & Sutton, 2000)
36 (Nonaka, 1987)
The most successful practice found in an external industry benchmark
• The most successful practice found within the firm
• The only practice we know about right now, and is therefore the best we currently have

It is important to define what the company is searching for in terms of these definitions, as it will impact the content of the standard work. Alternative descriptors could be: good idea, good practice, local best practice, and industry best practice. When someone eventually goes to write down standard work, it should be clear to them what they are documenting, or it may lead to inaccurate or unplanned information being included.

This challenge persisted at Sikorsky, and took time to define. The initial desire was for written standard work developed for the internal best practice, even if none existed. However, the desired speed of implementation was too great to prepare a new best practice when the existing practice remained undocumented. In general, the best existing practices were documented; the most successful practice discovered during the exploration being documented. As is the case at Sikorsky, there is some learning required for the organization to decide what level of best practice to include.

Knowledge Asset Branding

The name of the standard work program can seem a minor detail compared to the magnitude of the potential impact, but is an important consideration. The name of a knowledge sharing system does make a difference and impact on its use. A “lesson learned” or “best practice” can transform its meaning into “mistake” or “no improvement necessary,” depending on the organizational context. Therefore, the name given to the standard work program should not be overlooked, and the organizational resistance piece of the upfront analysis gives clues to successful branding techniques.

The Sikorsky standard work program is called the, “Assembly and Flight Operations Franchise Book.” The term Franchise Book is selected on several criteria:
• It is a catchy name, easily remembered
• It is non-threatening to other parts of the organization worried about controlling their processes
• The use of the word “franchise” implies that work content and processes are transferrable from location to location, and is all encompassing for these parts of the Assembly and Flight Operations organization

This brand had good effect on the acceptance rate of the standard work product. A “best practices database” or “work training guide” would not have had the same reception.

37 (O'Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)
38 (Dixon, 2000)
39 (Upton, 2005)
For the Team

The project manager is responsible for forming a team to support and sustain standard work. It is a significant challenge for one person to create a standard work program on their own, and there is much knowledge gained by bringing in motivated members willing to contribute. The project manager is a facilitator of this team, sharing the content framework with them in preparation for their involvement. The project manager only "owns" this framework, or the strategy behind how standard work will be developed and deployed, Figure 6.

![Standard Work Strategy diagram]

"Owned" by project manager

"Owned" by content owners

Figure 6: Standard work ownership

The standard work team specifically refers to the organizational structure of the leader, project manager, and content owners, though functional users can easily be brought in. Forming a team has several benefits:

- It encourages interaction and engagement between the content owners and project manager. This leads to increased reflection on the strategy and functional content, generating more recommendations for improvement.\(^{40}\)
- It creates an informal network of content owners, which increases organizational communication and dialog, and increases their learning during the process.\(^{41}\)

There are several approaches to how the best practice will be discovered by the team. The organization can develop benchmarking teams, best practice teams, knowledge and practice networks, or conduct internal assessments and audits.\(^ {42}\)

While a more organized team leads to improved knowledge sharing between the content owners, it can be difficult to implement. The Sikorsky team is not organized in any specific way, and is more a network of resources used by the project manager to get the job done. Leveraging the leader's ability to pull people together, stemming from organizational power and communication skills, is a good stepping stone to leading a stronger team.

\(^{40}\) (Nonaka, 1987)
\(^{41}\) (Rosenberg, 2006)
\(^{42}\) (O'Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)
Throughout the process, the project manager must be aware of who the content owners are. The overwhelming amount of information available in the firm has the tendency to overshadow the importance of the people involved. Maintaining an ownership registry, of who the content owners are and what they are responsible for greatly improves the ability to manage the process. The Sikorsky registry of owners is incorporated in the update cycle tracking system, see chapter 7 and Appendix 6.

**Standard Work Strategy: preparing for functional content**

An explicit change process is a prerequisite to beginning the documentation process. This is the strategy ownership piece identified in Figure 6. The project manager defines what “done” looks like, creating a template for building information into the system. The strategy should address how the documentation should occur, keeping in mind the value of capturing tacit knowledge.

The AFO Franchise Book is broken down into chapters, each chapter the responsibility of a content owner. The first chapter is titled, “Franchise Book Strategy,” and outlines:

- The purpose of the Franchise Book
- How to use the Franchise Book
- Who it applies to
- The responsibilities of the project manager and content owners
- How to access its information
- The revision process
- Formatting and updating guide

Much of this information is further developed over the course of implementing standard work, as there is a learning process for the project manager, but some initial guidance is necessary. There are several tips to improving the usability of these sections, leading to improvements in the functional content chapters:

- Keep the language simple. Complex language can create a barrier to action by adding confusion and misunderstanding. Action is required of the content owners to create and deploy standard work throughout the process, and the fewer the barriers to this implementation the better.
- Involve the end users. The content owners and project managers will have their own ideas of the look and feel for written documentation, but user input will reduce resistance once deployed.
- Learn as you go. Standard work formatting, strategy, and use are iterative processes, and there is much learning for all persons involved. It is important to set a starting point for the content framework, not necessarily to get it perfect the first time. It is more important to start the process of documenting rather than waste time with excessive planning.

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43 (Loshin, 2001)
44 (O’Dell & Grayson, If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice, 1998)
45 (Rumizen, 2002)
46 (Pfeffer & Sutton, 2000)
47 (Rumizen, 2002)
• Some “overhead” pages are necessary for providing an effective structure, Appendix 4. Overhead pages are for general reference, with no process standard work, such as title pages, tables of content, and feedback pages. The Franchise Book has roughly 12% overhead pages to support the content framework.

• Consistency among chapters improves overall readability of standard work. Each chapter for the Franchise Book has the same requirements, shown in Appendix 2: a process title, a brief document introduction, listing of any company policies or government requirements that regulate the process, identification of any company applicable forms, general definitions of complex terms used in the content, and listing of all appendices that contain amplifying information.

An internal or external benchmark helps develop the look and feel of the framework. An internal benchmark at Sikorsky showed a valuable process and format already in place for capturing business processes. Reviewing the existing framework and tailoring it to the needs of the new standard work reduces time required to plan and understand a good framework, maintains consistency among the various forms of documentation at the company, and provides a method for future integration of different types of standard work programs. The Sikorsky AFO Franchise Book formatting guide and format template are included in Appendix 1 and Appendix 2 respectively.

Standard Work: The six-sigma Tool

Standard work is typically described as a six-sigma or lean tool for process improvement, used to minimize variation in the process output quantity and quality. Typical requirements for standard work application are:

• A repeating sequence of production steps or operator activities
• A process assigned to a single operator
• A process balanced to a takt time

The term “standard work” is somewhat loosely used in this thesis, as the strict definition above may be too rigorous for certain applications. In particular, the organizational culture and expected resistance identified in the upfront analysis may create an effective barrier against applying standard work in the six-sigma definition. This does not mean it cannot be accomplished, only that more resources and organizational commitment is necessary to carry it through. In a situation such as Sikorsky, where time and resources are both limited, the standard work program makes an attempt to meet the specifications called for in the above definition, but may need to be more flexible to ensure a quality series of written documentation can be deployed in the given amount of time.

There are several tools used for standard work development which can assist in understanding the process, capturing information, and creating documentation. Even if the program does not meet the requirements above, evaluating and selectively using these tools proves useful to the process:

48 (Labach, 2010)
49 (Labach, 2010)
Few of these tools are used in documenting processes for the Franchise Book. The large number of processes required for documentation and the low number of resources did not allow for time studies, process improvements, or audits. Some processes include standard work layouts or cycle time charts, though there is no standard approach. It is difficult to tie some of these tools to non-production activities, though it might be useful to apply more of these tools during the Franchise Book update process, chapter 7. Regardless of their use, understanding the value of these tools remains important to the documentation process. Knowing the correct terminology and resources available sets a standard and improves consistency across multiple chapters and content owners.

The Role of Information Technology (IT)

Few IT resources are used in the development of standard work at Sikorsky. This approach worked well, as O'Dell and Grayson say IT is an enabler to knowledge management, not a solution\(^5\). There is no need for a large scale IT database or software with new functionality to write, deploy, and maintain standard work. The only requirements for creating standard work are:

- Word processing software to create the documentation
- Spreadsheet software used for tracking purposes
- Simple graphics programs, such as Microsoft PowerPoint or Paintbrush to generate visuals

The only added complexity is when specific data is required for inclusion. For example, Sikorsky did not maintain a master list of certain tools and consumables to stock for operator use. The collection on-hand stock was developed and refined through years of use. In a circumstance like this, data extraction software is required to pull information out of existing databases; here, historical order quantities.

Publishing and sharing information may have additional requirements, though it is best to keep the system simple to use and easy to operate. The Franchise Book uses little IT support, which is only required for electronically publishing standard work files on the internal website.

\(^5\) O'Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003
Summary: Setting up the Spiral of Knowledge

In general, the goal of the content framework is to prepare for an effective spiral of knowledge\(^1\). A good framework allows for the following transfer of information:

1. Tacit information from the expert process user to tacit information in the process documenter
2. Tacit information of the process documenter into explicit information written in the documentation
3. Explicit information in the written documentation to tacit information of the non-expert process user

The spiral transfers information from the users, to the documenter, to the documentation, and back to the users.

This spiral of knowledge is prepared through content owner team forming, the look and branding of functional content, acknowledgement of the six-sigma standard work tools available, and appropriate use of IT resources. The execution of the spiral of knowledge comes from good techniques for capturing information and ensuring a sustainable standard work program are in place.

\(^1\) (Nonaka, 1987)
CHAPTER 5: DEVELOPING STANDARD WORK CONTENT

Overview:
There are four steps to the knowledge creation process: socialization, externalization, combination, and internalization. Developing standard work content focuses on the first two, which transfers tacit knowledge into explicit. The standard work team must decide what content is worth capturing and select the appropriate person to create the documentation. Techniques for improved writing then help the content author create a well balanced, accurate standard work package.

The Knowledge Creation Process

Writing standard work is a process of knowledge creation; even codifying existing information creates new knowledge. The spiral of knowledge gives a good framework for creating a learning organization and for capturing best practices:

1. Socialization: transferring tacit knowledge from one person to tacit knowledge in another
2. Externalization: making tacit knowledge explicit
3. Combination: finding a useful forum for explicit knowledge
4. Internalization: forming tacit knowledge from explicit information

In developing content, the focus is largely on socialization and externalization. Combination and internalization are a function of how to share the information, chapter 6.

Socialization
This technique is critical regardless of who documents the process. There are two general options for who will document the process, either the expert user who knows the best practice, or someone else, such as other users, the content owner, or the project manager. Socialization is most important when the person writing is not the expert user, in an effort to capture as much knowledge about the process as possible before making it explicit.

When the person writing standard work is not a content owner or project manager, tacit to tacit knowledge transfer regarding the content framework is first required between them and the user. In this case, the goal of socialization is to ensure the user understands the content framework in terms of what and how to document.

Externalization
The process of externalization does not capture all tacit information, as significant time, experience, and reflection develop a person’s breadth of knowledge. The process captures some meaningful part of this knowledge that will help someone else learn more about the subject.

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52 (Rumizen, 2002)
53 (Davenport & Prusak, 1998)
Internal and External Content Benchmarking

Benchmarking for content refers to the source of the best practice. An internal benchmark seeks inside the firm to model the process, external looks to the standards of other companies. For processes that are not well understood within the firm, internal benchmarking is recommended, as it is often more effective than looking to the actions of others\textsuperscript{54}. Standard work leads to a better understanding of the process, and helps identify the sources of variation. Once the process is fully understood, an external benchmark may be useful.

All best practices identified at Sikorsky for initial publication in the Franchise Book are discovered through internal benchmarking. Where multiple practices are encountered, the content owner, project manager, and expert users work together to identify the best, which is then documented. Future revisions and further content development outside of initial publication of existing processes benefits most from external benchmarks.

Who Should Capture Best Practices

There can be two competing priorities in writing standard work:

1. Process improvement – learning about the process leads the company to improve the process
2. Process standardization – learning about the process enables the company to repeat existing practices

Both can occur at the same time, but deciding who writes the standard work can have an impact on which takes priority. The organization may not be as interested in process improvement, such as the case with Sikorsky, where identifying the existing standard so it can shared in a timely fashion to new plants and products is the focus. On the other hand, improvement may be the primary focus, with standardization being used more as a means to achieve it.

There are different options for who can write the standard work as well as differing opinions on who should write it. Davenport says the process of codifying the information (externalization) teaches the codifier\textsuperscript{55}. Jennex and Olfman expand on this, describing how learning occurs as perceptions of the process change after reflecting on experiences and observations\textsuperscript{56}. These lead to a question: who does the organization want to be the recipient of the knowledge created through the process of writing standard work? It may be more valuable for:

- The expert user to learn, so they can use the information for process improvement
- The inexperienced user to learn, so they will become the new expert
- The content owner to learn, to keep better control and standardization of the processes they own
- The project manager to learn, to become an overall knowledge expert in the company

\textsuperscript{54} (O'Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)
\textsuperscript{55} (Davenport & Prusak, 1998)
\textsuperscript{56} (Jennex & Olfman, 2003)
The standard work team must evaluate these options and make a decision on who will write the documentation. Given that the majority of knowledge is tacit, writing standard work is an opportunity to learn much about the organization. In fact, the value in having written documentation may be in the act of writing it down, rather than having the information available in the end product. If this is the case, careful selection of the author is important.

Once the content author has been identified for a process, the best practice is documented using the content framework prepared. The means of identifying the best practice (benchmark, audit, etc), and format of the written work are already in place to support.

The project manager is the Franchise Book content author for the majority of the first publication, with some part time support staff identified in Appendix 3. The decision was made for the project manager to document the majority of processes primarily because of the few resources available and the short implementation time. A higher priority is then placed on the written documentation as a means to share information across plants, rather than in the learning that takes place during the documentation process.

**Content Worth Capturing**

The upfront analysis gives a good indication of how much detail can and should be included in the standard work, though there are several tips to improve the value of the content.

- Studies show the most effective way to communicate knowledge is through “a convincing narrative that is delivered with formal elegance and passion.” A convincing narrative helps the reader encode the information through their natural sense making process, improving the explicit to tacit knowledge transfer. There must be a balance between the bare facts and the story behind them. Adding feeling and context to writing improves the reader’s willingness to accept information.
- Some information should not be included, particularly that which will rapidly become outdated.
- The work content should be developed based on priority. The Franchise Book’s first priority is delivery to new plants, to improve their ability to mirror existing practices. The planning sections are written first, to account for plant upfront considerations. Industrial engineering comes second, to assist with work scheduling and reporting. Once the priority sections are complete, focus shifts to less urgent content, such as information technology or tool control.
- It is often more important to determine how the best practice works, rather than why it works. It is quite possible the content author will discover that no one really knows why a process works, only that it does. Documenting the mechanics, or the “how” of the process, is the first important step to creating the new knowledge that leads to understanding.

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57 (Davenport & Prusak, 1998)
58 (Rosenberg, 2006)
59 (Knowledge Management of Internal Best Practices)
Of the available information found in many companies, 80% is tacit and resists codification. Linking the source of the tacit knowledge by making people-to-people connections is therefore a valuable technique. This can be difficult with standard work since names are generally not included when personnel turnover makes it difficult to maintain up to date documents. Linking job functions, which are less likely to change, is a more effective method, and is used extensively in the Franchise Book to indicate where to go for additional information.

Effectively Capturing Information

The first challenge for the content author is finding the right experts who know about the process and can effectively communicate it. Much time can be lost documenting processes from the wrong person. The content author should establish a relationship with the content owner or project manager to start off in the right direction, yet should be able to do some investigative work in an attempt to reduce this risk.

Once the correct expert is identified, the author must find a suitable technique for acquiring information. Employees can feel threatened at the prospect of someone studying their job, even with good intentions. Davenport and Prusak recognize two good means for tacit to tacit knowledge transfer: mentoring and apprenticeship. Approaching the process expert in the form of a mentee or apprentice can improve the quality of the information transferred, and may be a technique for approaching in a non-threatening manner. Selecting content authors with good interpersonal and communications skills goes a long way toward building this relationship.

Summary: Developing Content as a Learning Activity

Developing effective standard work content is as good as the content framework and organizational structure there to support it. This is why the organization must focus attention on these upfront activities prior to diving into the documentation and capture of practices. This process represents an enormous learning opportunity for the organization, perhaps just as important as the actual sharing of the information and end standard work product.

Writing standard work is a learning opportunity that goes unplanned and underappreciated if not understood. The content author learns the most, being in a position to observe, reflect, and internalize the processes. This learning process can be leveraged by the organization to conduct process improvements after the documentation is developed, greatly increasing the overall value of standard work.

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60 (Rumizen, 2002)
61 (Rosenberg, 2006)
62 (Davenport & Prusak, 1998)
CHAPTER 6: SHARING BEST PRACTICES ACROSS THE ORGANIZATION

Overview:
Simply developing standard work does not mean the best practices contained therein will effectively propagate throughout the organization. Understanding the barriers to knowledge transfer and overcoming them in the publishing and deploying stages are critical.

Barriers to Effective Transfer

Acknowledging existing barriers to the transfer of knowledge leads to an understanding of the approaches necessary to implement standard work and share best practices. Different actions are used across different organizational cultures, and the organizational resistance expected from the upfront analysis helps in this decision. Szulanski studied the transfer process in eight companies and found four factors that influence the difficulty:

1. The knowledge transferred – its “taciness” (how hard it is to make explicit) or “unprovenness” (no one has verified it works in other applications)
2. The knowledge source – the information owners or users have important stakes in the information
3. The recipient – a lack of motivation or absorptive capacity
4. Context – no organizational reason exists to support the transfer, or organizational structures make the transfer difficult

Of these, the greatest barriers found in the Szulanski study are: absorptive capacity of the recipient, causal ambiguity, and relationships. The study also shows that these types of factors can cause best practices to take up to 27 months to transfer from one part of the organization to another. Addressing these barriers is critical to ensuring successful transfer of best practices and adoption of standard work.

Absorptive Capacity

The recipients of standard work must be given time to read, understand, and question the information they are given. Many process users lack sufficient free time or motivation to self-educate themselves, leading to a low absorptive capacity. A rewards system that encourages participation in standard work, and frequent face-to-face communication with the users are methods to address this issue.

Absorptive capacity is one of the most significant challenges to implementing standard work at Sikorsky. Content owners and users alike have little motivation to understand and adopt written documentation as a whole package. Instead, it is viewed as a reference when a roadblock is reached and additional information is needed on a particular subject. The goal is to have the information be understood ahead of time, to correct existing non-best practices. Frequent communications

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63 (Szulanski, 1996)
64 (Orell & Grayson, If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice, 1998)
initiated by the project manager help alleviate these difficulties, though some sort of rewards system would be a natural next step.

Causal Ambiguity
Organizations often do not understand why things happen, only that they do and the resulting causal ambiguity hinders knowledge transfer. While standard work does not always need to document why things work to be effective, this can still hinder some effective knowledge transfer. This issue is discussed above in the “content worth capturing” section, and must be addressed before the knowledge is captured. Waiting until the implementation stage is too late.

Relationships
Effective relationships between the recipient and the person deploying the best practices are a significant factor to overcoming barriers to transfer. This is one of the reasons a proper project manager is so critical to the standard work process. Effective relationships must be built during the entire process. Deploying a system of standard work without can reiterate a lack of motivation to adopt newly identified best practices. Each individual recipient of the Sikorsky Franchise Book was met face-to-face, one-on-one, with either the project manager or a content owner to strengthen this relationship and trust in the product.

Keys to Effective Transfer

Having first identified barriers to transfer, solutions to the anticipated challenges are implemented. O’Dell and Grayson point out seven keys to effective transfer.

1. Generate urgency with a compelling reason
The upfront analysis defined the reason standard work is necessary for the company, so a compelling reason is already identified. Sharing this message with the recipients encourages acceptance. The one-on-one encounters with each Franchise Book recipient at Sikorsky provided an opportunity to stress this reason, though it proved difficult to tie the reason (need for new plant standardization) to the goal (need for existing plant standardization) at the legacy location.

2. Focus on critical issues with high payoffs
Standard work implementation should always begin with the most important pieces deployed first. Writing sections in order of priority and immediately deploying them achieved this means with the Franchise Book. Completed chapters deployed to new plants, for instance, generated awareness of the book within the company and created internal demand for more information.

3. Limit the number of projects to what is achievable
There is a limit to amount of information and knowledge one person can manage. An effective project manager limits the breadth of knowledge capture and intuitively understands the sustainable growth of standard work. Overreaching can easily lead to underperforming and delivery of poor standard work product, inhibiting effective transfer of information. Knowing what

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65 (O’Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)
level of detail is appropriate through the upfront analysis helps identify the appropriate scope. Franchise Book scope creep is limited through use of an improvements tracker (chapter 7). Rather than immediately adding to the existing work content, any unplanned, additional work encountered is added to a list of future improvements to make in the Franchise Book.

4. Do not let measurement get in the way
It can be difficult and time consuming to quantify the effects of implementing standard work. Apples-to-apples comparisons are challenging to create and communicate, limiting the effectiveness of continual valuation of knowledge assets. Using valuation may help justify a need for standard work, but can slow down implementation if used to over-evaluate which projects to tackle. Little to no valuation is used in developing and deploying the Franchise Book. The best place for this consideration is in the sustaining phase, where new best practices replace the old.

5. A reward system encourages knowledge sharing and best practice transfer
Users are more likely to participate in knowledge transfer and adopting standard work when rewarded to do so. Tangible rewards, such as monetary based ones, are often difficult to setup in the existing company rules, and the organizational structure supporting standard work may have little ability to change it. Effective communication between the team deploying standard work and the users can create more intrinsic, intangible rewards.

6. Use technology as a catalyst for support, not as a solution
A proper IT plan, identified in the content framework, addresses this concern.

7. Leaders consistently and constantly spread the message
There are different messages the leader shares with the users. It can begin with the importance of supporting the documentation process, shift to the value of adopting the standard work, and lead to a focus on sustaining. Recognizing these focus areas on which to communicate, and spreading the message during all stages opens communication with the workforce and improves the acceptance rate of standard work.

How to Publish Information

Written content can reside in two formats: electronic and hardcopy. There is value in both, and are evaluated for their effectiveness in successful sharing of best practices.

Electronic Format
In nearly every application, best practices are documented in electronic form. An initial draft may be created in hardcopy, but will end up written with word processing software in electronic form for the final draft. Rosenberg studied the adoption rate of information, and found an increased use rate of information that is easily searchable, namely in electronic form66. This is good cause for providing access to best practices in some sort of electronic format.

66 (Rosenberg, 2006)
Electronic copies must be accessible by each part of the organization and the location must be well known. The Franchise Book is housed electronically in the Sikorsky enterprise documentation web server. Many users are familiar with the electronic location of this document path, which improves accessibility of the information. Those who are unfamiliar with it are shown how to access the electronic information during the deployment one-on-one meetings.

**Hardcopy Format**
Rosenberg also found that the fewer the locations the sources of information reside, the more likely it will be used. Multiple locations for the same best practice generates confusion, makes it difficult to know which is the most recent, and leads to decreasing use rates. When hardcopies are necessary, care must be taken to address these challenges.

Standard Work found in the Franchise Book is required in hardcopy format, as electronic access and use is too great a barrier for a certain subset of its users. To ensure each hardcopy is up to date a revision number is written on the cover of each chapter, and the words, “verify current revision of this document... prior to use” is labeled on each page, Appendix 2. In addition, the project manager tracks how many hardcopies have been distributed, which verifies each person who needs one got one, and allows verification that each copy has been updated when required. These actions mitigate the problem, but do not eliminate the threat of old documentation, so hardcopy update procedures are required as part of the standard work sustaining process.

**Deploying Standard Work**

Publishing the work and removing barriers to transfer prepare the organization for standard work; the next step is to actually deploy it. The standard work team, the leader, project manager, and content owners, work in coordination to distribute standard work, communicate its importance, and verify it is being used. There are several techniques in particular that help the process, including supervisor involvement, focus on early adopters, speed of information sharing, and encouraging discrepancy identification.

Prior to giving standard work to the user, it is important to involve the user’s immediate manager. A user who receives positive messages from their work leader as well as the official standard work leader is more likely to accept the standard work. These managers should be made aware of the program during the implementation stage anyway, so it will likely be no surprise. Here, timing is the consideration, making them aware of the deployment real-time.

It is important to focus on early adopters, those who jump into the program right away. Building a network of supporters in the user community builds momentum for the project, encouraging the second wave adopters to join. The early adopters can take the message, and communicate it for the leader and project manager, doing more good from inside the user organization than otherwise possible. A select portion of the Franchise Book is deployed to more than 100 front line supervisors. With such a large number of people receiving standard work all at once, it is important

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67 (Rosenberg, 2006)
to generate motivation in the most influential supervisors of the group. Those who have strength in peer support and a voice that carries weight are identified, and more time is spent with them to generate this support.

The speed of sharing information is an important consideration. "Haste eliminates waste" says Stewart. The faster knowledge moves, the faster the organization figures out the process and the faster they can adjust it. As soon as chapters of the Franchise Book are published, they are shared across the organization in an expeditious fashion, though not so fast as to avoid building the network of supporters above.

Though many users access standard work information online, hardcopy format has many attractive features. The look and feel, as well as the ability to quickly scroll through pages generates significant demand for hardcopies, even when electronic format would suffice and be more economical. Demand for Franchise Book hardcopies at Sikorsky quickly outstripped the supply available, and repeated reprinting became necessary. To handle the demand, a kanban system is setup to place orders for new books, Appendix 7. Hardcopies are maintained by the program manager, who distributes, tracks, and orders books. A kanban log is used for tracking purposes, Appendix 8.

Discrepancies in the standard work content are inevitable, it is very difficult and time consuming to have every piece of information correct. This is acceptable, as it can be a rich source of information for the company if managed in the right way. Encouraging feedback in the first deployment of standard work is the first step towards sustaining the entire program. Forcing people to think of new ways to solve a problem encountered with the methodology of the documented process, encouraging people to disagree with methods proposed, and creating a forum for communicating these differences is a method of verifying that standard work is being used and sustained.

Summary: Sharing Knowledge through Deploying Standard Work

Deploying standard work effectively is a method of sharing knowledge across the organization. When publishing first editions, the organization is likely sharing many existing practices, rather than best practices, underscoring the importance of effective techniques in sharing the information therein. Publishing does not guarantee use, and the team deploying standard work has many tools to assist in organizational adoption.

Identifying existing barriers to knowledge transfer and creating means to combat them is the first step toward sharing across the organization; publishing standard work is a significant milestone in the overall process. Once the book is published and distributed, focus then shifts to sustaining standard work, zeroing in on the best practice, and making process improvements.

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68 (Stewart, 2001)
69 (Nonaka, 1987)
CHAPTER 7: SUSTAINING STANDARD WORK

Overview:
Sustaining standard work refers to creating a program that is used, tracked, and continually improved within the organization. The risk of decline in utilization of standard work is great, creating a barrier to sharing best practices within the organization. Proper planning and updating procedures mitigate this risk, pivoting off initial successes with the first update and creating a culture of sustaining.

The Need for Planned Sustaining Activities

Lack of planning for a comprehensive standard work program puts sustainment of the entire program at risk. The organization does not want to expend resources in generating a well documented process guide only to have it fall into disuse and become quickly outdated. As information becomes dated, usage drops off, eventually terminating the program through neglect. As Pfeffer and Sutton describe, creating a tangible good and the use of it in ongoing practice are not necessarily tied. Explicit information can be created, but the knowledge therein may not be appropriately and effectively shared as time goes on.

This risk is particularly poignant at Sikorsky, where the project manager was selected as a temporary assignment to fill the need for standard work. The natural progression of standard work deployment led to a transitioning of responsibilities from one project manager to another during the initial sustaining phases after publication. A breadth of knowledge built during the deployment stages is lost to the organization without proper planning for these sustaining activities.

General Sustainment Recommendations

There are activities the organization can plan that improve the likelihood that standard work will be a sustainable program. From the beginning, the amount of time commitment required to sustain standard work must not be underestimated. Appendix 3 shows the time commitment at Sikorsky, in terms of percent time committed to planning and writing compared to time sustaining. This data was prepared and estimated by the project manager as a method to highlight resource commitments. Overall, 22% of the organization’s commitment to standard work came from the sustaining phase. In this regard, the “sustaining phase” only accounts for time spent in deployment. Since sustainment is an ongoing activity, the time commitment will significantly grow. There are several general recommendations that support standard work sustaining, including creating turnover planning, communities of practice, linking to human relations, and workforce autonomy.

The data in Appendix 3 underscores the need to plan for personnel turnover in the standard work deployment staff. As the time commitment necessary during the sustaining phase grows, disruptions in project ownership lead to decreased effectiveness in sustainment. The organization

70 (Pfeffer & Sutton, 2000)
must keep commitment high, or the workforce will revert to its old practices. Constant and consistent communication is necessary to prevent this and properly planning for a change in the leadership or project management staff prevents a slowdown in sustaining activities. Sikorsky’s shift in the project manager during the initial sustaining phase was known in advance, and proper planning led to a more effective handoff.

Creating communities of practice encourages spontaneous, unstructured knowledge transfer and creates the opportunity for new idea generation. A community of practice is some sort of forum to get employees talking about standard work. It can be planned or unplanned, as long as the project manager has some focus on its development. This effort is more successful if managers are brought into the program early, as recommended during the deployment stage. Such is the case at Sikorsky, where the front line supervisors receiving standard work have two opportunities to talk about the standard work, at the formal shift transition meeting and at shift handoffs from one supervisor to another. Franchise Book deployment partly occurred during these two activities, encouraging supervisors to talk about the product. Additional focus on more specific communities of practice could help improve sustaining activities at Sikorsky.

Linking Human Relations (HR) to the standard work program assists sustaining activities, as HR programs are often close to the line and employees. They can greatly assist in linking knowledge management to job functions and any rewards systems put in place. This link is yet untested at Sikorsky, though is a potential next step in the sustaining process.

A more difficult aspect of sustaining standard work involves the organizational autonomy of the workforce. Studies suggest that as user autonomy increases, the rate of knowledge transfer increases. As employees become more responsible for their work, they are also responsible for solving problems encountered. With the ability to make decisions their willingness to perform appropriate research increases, which improves the rate and quality of knowledge transfer. Thus, a standard work program is supported and encouraged by increased workforce autonomy. This may not be viable in all applications and organizational contexts, but is worth considering as a potential means to assist the sustaining process.

**Updating Content**

Updating content is the most important part of standard work sustainment. The first update is a hurdle that once overcome, gives lasting power to standard work, depicted in Figure 7. The organization goes through repeating cycles of publishing, using, and updating standard work, and once the initial momentum is built, experiences a natural sustaining force.

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71 (Rosenberg, 2006)
72 (Davenport & Prusak, 1998)
73 (Hackett, 2000)
74 (Molina, Lloréns-Montes, & Ruiz-Moreno, 2007)
The Franchise Book is deployed to users with a key message, intending to build a culture of questioning and using standard work, and to lead into the first update process. This message is prefaced through the relationship built with the users, who already understand the value in the standard work product. The message is simple, conveying two desired outcomes:

1. Each user reads the standard work, cover to cover, and immediately provides feedback, recommendations, and suggestions for improvement, both for processes and information contained in the writing.

2. Users become accustomed to using the standard work in their daily routine.

By immediately capturing feedback, the project manager can initiate the first update. Franchise Book feedback is simple, either an e-mail to the project manager, whose contact information is on every page of the standard work, or by filling out the feedback form at the end of each chapter, Appendix 2. Standard work cannot be static, and updates must be an ongoing interactive process.

Any feedback received must be immediately logged in a system that allows the project manager to track user comments. Process recommendations are distributed to the leader and content owners for consideration. The project manager makes a judgment call on feedback concerning the standard work content. Documents with glaring errors may need immediate correction, otherwise the feedback is added to a list of improvements for the next chapter update. The Franchise Book uses a simple Microsoft Excel spreadsheet to track updates, Appendix 5. Collecting feedback also helps measure the effectiveness of the sustaining process. Tracking the number of recommendations received in a given period of time gives an indication of use.

Once the initial update is complete, standard work chapters must be updated per a structured process. There are two general options:

1. Schedule based: chapters are reviewed and updated at certain time intervals. This method is selected for the Franchise Book to give structure to the process, each chapter being updated every six months. The program manager creates a tracking system to plan updates, Appendix 6.

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75 (O’Dell & Grayson, Identifying and Transferring Internal Best Practices, 2003)
2. Feedback based: chapters are updated when a certain number of recommendations and suggestions for improvement are received. This was not selected for concern it would lead to stagnation of the information when no feedback is used. It might be a good method for products with frequent process changes, where a large amount of feedback is received at irregular intervals.

Creating an update cycle designed as a pull based system can improve learning, as users create their own personal libraries of standard work information that is most important to them. This is applicable to both options above, as each update is loosely based on demand. New sections or added content is created based on user request from feedback received, rather than a repeat of the content development cycle. Best practices are then compared, challenged, tweaked, and replaced as necessary.

Some budget consideration is important for sustaining standard work. At 800 pages, a bound hardcopy of the Franchise Book costs roughly $100, which quickly adds up when deploying updates. The program manager estimates demand, and ensures a budget is available to pay for updates and new copies.

Culture of Sustaining

Pfeffer and Sutton identify one of the significant hindering forces to sustaining projects like standard work: companies naturally revert to their past ways of doing things, as reaffirming the firm’s social identity and history, and fear of change stifles new innovations. The solution is to build an organization that resists action without thought, and encourages questioning behavior. Thinking and questioning encourage the use of standard work as a means to self-educate and challenge one’s beliefs. The challenge is in creating this type of culture.

The project manager plays a large role in sustaining standard work, but requires the support of the content owners to create a culture of sustaining. Building a relationship with the content owners to support deploying standard work is only half the commitment required. It is easy for the content owners to assume no more is required of them, and their involvement with standard work and identifying best practices stagnates. On the contrary, their involvement is necessary for continued support of the program. The project manager cannot have ties and constant communication with every user, the content owners must do so. Encouraging feedback and monitoring use of standard work is a major function of the content owner in the sustaining phase.

A main indicator of success of sustaining standard work is the level of contributions made by users. The more contributions made, the more sharing and learning involved in the organization; leading to new best practices uncovered. Jennex and Olfman evaluate several studies that indicate the workforce’s willingness to contribute is determined by an organizational culture that promotes

76 (Rosenberg, 2006)
77 (Pfeffer & Sutton, 2000)
sharing. Soliciting feedback for the first round of edits begins this process of sharing, but does not necessarily change the existing culture.

Nearly all references used in this thesis agree on one key aspect of creating a sustaining culture, the role of a system of rewards to promote sharing information. Regardless of the method, the reward must be inherent to the system, not artificially created to spur contributions. Rewards can be official recognition, celebration, or self-rewarding, but the most effective are those intrinsic in nature. An intrinsic reward is intangible, such as making the job easier for the user, or giving a sense of satisfaction for a job well done. Building this into the culture takes time and commitment from the project manager and content owners. Showing the users they can make a difference, and positively impact standard work begins building intrinsic rewards into the system.

**Summary: How to Keep Standard Work Alive**

There are two worst case scenarios for the after-effects of deploying standard work:

1. Standard work is implemented, and slowly forgotten through disuse
2. Poor implementation leads to decreased operational efficiency, as the real best practice is overshadowed by the documented process, or poor documentation causes confusion

Properly planning and executing the sustaining phases of standard work prevents the occurrence of these possibilities. An immediate update cycle is critical, building momentum in adoption and use of standard work, and improving on the quality of the writing. Long term sustainability of standard work is achieved with an active project manager who tracks feedback and coordinates future updates, content owners who remain involved, and continued communication and visioning from the leader.

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78 (Jennex & Olfman, 2003)
79 (O'Dell & Grayson, If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice, 1998)
CHAPTER 8: SUMMARY OF THE STANDARD WORK IMPLEMENTATION PROCESS

Overview:
Successful standard work is defined through the process flow identified in Figure 8.

The Planning Phase

The sharing of best practices through standard work represents significant opportunities for a company. Increased knowledge transfer leads to increased operational efficiency, as wasteful practices are stopped in place of a unified approach. There are actions the company can take to increase the likelihood that a standard work program will capture the correct information, effectively transfer best practices, and succeed in the long term.

Proper upfront planning is necessary to lead into sustainable standard work. An upfront analysis is first conducted, identifying the need, defining the problem, self-selecting a change agent, and focusing on the organizational commitment requirements. Once these general factors are understood, an organizational structure is set up to support the program, largely focusing on a leader, project manager, and content owners. The standard work team is then prepared to use details of the upfront analysis to create a framework for standard work content, clearly setting a vision for the end state. Figure 9 identifies these first stages of the standard work development program in flow chart form.
**The Sustaining Phases**

Planning prepares the company for standard work, and successful execution of sustaining activities leads to a lasting product. As Stewart says, “Products die and projects end; processes last.” The company that institutionalizes the standard work, and makes it a part of the way they do business, sustains standard work.

Sustaining standard work is similar to the development stages, which is why creating content and initial deployment are considered part of the sustaining phase. The organization seeks to create a continuous cycle of knowledge creation, Figure 10.

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80 (Stewart, 2001)
Many challenges are encountered along the path to standard work, aligned with the steps in Figure 10:

1. A motivated facilitator (project manager) is an effective change agent
2. The level of detail must aligned with the strategy identified (range of options)
3. Publication and distribution of information is a lengthy, time consuming process
4. Leadership and project management must be balanced to support a cultural transition
5. The repeating cycle will only succeed with full content owner support

A company that overcomes the challenges by following the guide presented, Figure 8, and takes the steps necessary to effectively manage standard work is naturally inclined to sustain the program. This leads to full organizational adoption of the change and resolution to the original problem presented.

Summary: Standard Work in Action at Sikorsky

Six months of deploying standard work at Sikorsky led to the development of 800 pages of written documentation deployed to more than 125 users in the main factory and one of the newer plants. Additional time is required to finish the first sustaining cycle, gathering initial feedback for the first update, so the program yet remains in the early sustaining phase. A content framework and organizational structure is in place, with methods to continue sustaining activities prepared. Continued deployment to remaining facilities, completing the update process, and further developing relationships with the content owners will strengthen the standard work adoption rate. Integrating it into a company-wide knowledge management program would be an excellent next step, creating the opportunity for more parts of the organization to participate.

The Franchise Book created at Sikorsky is a knowledge asset the company uses to educate new workforce, standardize processes, and identify best practices. It provides the means to share knowledge across the organization, from different product lines to plants located across the world. These benefits
justify the organizational effort and commitment required to implement standard work, and represent a new internal best practice at the company.
BIBLIOGRAPHY

Knowledge Management of Internal Best Practices. Chapel Hill: Best Practices, LLC.


Appendix 1: AFO Franchise Book Formatting Guide

<table>
<thead>
<tr>
<th>SIKORSKY AFO FRANCHISE BOOK</th>
<th>CHAPTER 1</th>
<th>Page 10 of 18</th>
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Any appendices are to be included on the AFO file share and are not printed out with the book. Include links to them where possible in the text of the document.

Functional subdivision with identifiable content owner. E.g. Industrial Engineering, planning

Organizational competency. A section is one separate document within a chapter. E.g. Manpower allocation

Used when the competency is too big to document in one file. E.g. balance charts and SAP updates are part of manpower allocation

**1. Chapter**

**A. Section**

**i. Sub-section**

Verify the point of contact

Internal Reference Guide

 Sikorsky Proprietary and Confidential. Use or disclosure of data contained on this sheet is subject to the restriction on it. Verify current revision of this document in Worldwide Plus prior to use.

Suggestions, comments, improvements please contact [Disguised]
SAMPLE SECTION HEADING (Use Heading 2)

For each "people" chapter include:
1. Job description
2. Roles & responsibilities
3. Span of control
4. Hiring Criteria
5. Central (Stratford) or remote function

Always right click the table of contents on page 2 and select "update field" then "update entire table" before saving and closing the file.

Remove any hyperlinks. The document cannot be published in Worldview with active hyperlinks.

Sikorsky Proprietary and Confidential. Use or disclosure of data contained on this sheet is subject to the restrictions set forth on this page.

Suggestions, comments, improvements please contact: Disguised@ sikorsky.com
AFO FRANCHISE BOOK
An Internal Reference Guide

Chapter 1: Title
Table of Contents

TITLE ........................................................................................................................................... 3

SAMPLE SECTION HEADING (Use Heading 2) ................................................................. 4

SUGGESTIONS AND IMPROVEMENTS ........................................................................ 5

APPENDICES:

Franchise Book

Suggestions, comments, improvements please contact Disguised@ sikorsky.com
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Appendices (1) Name
Directions: submit to point of contact below as soon as any comments are received

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Appendix 3: AFO Franchise Book Development Time Data

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<tr>
<th>Standard work staff</th>
<th>Amount of work day dedicated to standard work program</th>
<th>Number of work days at Sikorsky</th>
<th>% of standard work time spent writing</th>
<th>% of standard work time spent planning and sustaining</th>
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</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>80%</td>
<td>132</td>
<td>75%</td>
<td>25%</td>
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<tr>
<td>Project Manager Mentor</td>
<td>5%</td>
<td>132</td>
<td>5%</td>
<td>95%</td>
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<td>Part time employee</td>
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<td>44</td>
<td>95%</td>
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<td>Part time employee</td>
<td>25%</td>
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<tr>
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<tr>
<td>% of total time</td>
<td>78%</td>
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<tr>
<td>Number of work days for one full time equivalent</td>
<td>124.0</td>
</tr>
<tr>
<td>Average hours spent per chapter</td>
<td>45.1</td>
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Appendix 4: AFO Franchise Book Page Data

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<td>Type</td>
<td>Count</td>
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<tr>
<td>Total number of chapters</td>
<td>22</td>
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<tr>
<td>Total number of pages written</td>
<td>795</td>
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<tr>
<td>Total number of overhead pages</td>
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<tr>
<td>Average number of total pages per chapter</td>
<td>35.6</td>
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<td>Standard deviation of number of pages per chapter</td>
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<th>Chapter Overhead*</th>
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<td>Table of contents</td>
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<td>Recommendations spreadsheet</td>
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<td>Total number of overhead pages per chapter</td>
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<td>Book cover page</td>
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</tr>
<tr>
<td>Main table of contents</td>
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<tr>
<td>Total number of other overhead pages</td>
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* Overhead indicates a general reference page, with no process standard work
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section Reference</th>
<th>Date of Submission</th>
<th>Name of Submitter</th>
<th>Description of change or addition</th>
<th>Change Author</th>
<th>Due Date</th>
<th>Completed?</th>
<th>Change Revision</th>
<th>Notes</th>
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<tr>
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<td>3-A, page 5</td>
<td>11/11/2009</td>
<td>John Smith</td>
<td>There needs to be more detail included on XXXX.</td>
<td>Jane Doe</td>
<td>12/1/2009</td>
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Appendix 6: Franchise Book Update Cycle Tracker

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<thead>
<tr>
<th>Chapter</th>
<th>Scheduled Update</th>
<th>Content Owner</th>
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<tbody>
<tr>
<td>1 Strategy</td>
<td>January</td>
<td>July</td>
</tr>
<tr>
<td>2 Planning</td>
<td>February</td>
<td>August</td>
</tr>
<tr>
<td>3 Industrial Engineering</td>
<td>February</td>
<td>August</td>
</tr>
<tr>
<td>4 Supervisor's Standard Work</td>
<td>January</td>
<td>July</td>
</tr>
<tr>
<td>5 Assembly</td>
<td>April</td>
<td>October</td>
</tr>
<tr>
<td>6 Quality</td>
<td>June</td>
<td>December</td>
</tr>
<tr>
<td>7 Tools and Consumables</td>
<td>March</td>
<td>September</td>
</tr>
<tr>
<td>8 Information Technology</td>
<td>May</td>
<td>November</td>
</tr>
<tr>
<td>9 Finishes</td>
<td>May</td>
<td>November</td>
</tr>
<tr>
<td>10 Materials Logistics</td>
<td>March</td>
<td>September</td>
</tr>
<tr>
<td>11 Finance</td>
<td>May</td>
<td>November</td>
</tr>
<tr>
<td>12 Training</td>
<td>June</td>
<td>December</td>
</tr>
<tr>
<td>13 Flight Operations</td>
<td>April</td>
<td>October</td>
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<tr>
<td>14 Manufacturing Engineering</td>
<td>June</td>
<td>December</td>
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* The Strategy chapter content owner is the project manager

** Content owner names hidden
Appendix 7: Franchise Book Hardcopy Kanban

Franchise Book Fully Stocked

CHECK:
• Are there more than 6 copies?
• If yes: GOOD
• If no: see instructions below

INSTRUCTIONS:
• When only 6 copies remain
• Contact [Disguised] and order twelve 3-inch 3-ring binders
• Write your name, date, and additional info in the log
• When binders arrive, prepare repro work order & attach standard work (see folder)
• Bring work order and binders to the Xerox Copy Center
• (Flip this card over)

Franchise Book Copies Running Low:
More are on order!

CHECK:
• Are there more than 6 copies?
• If yes: flip to green side
• If no: check log, was binder order placed?
  • If no: see instructions on reverse
• Was binder order received?
  • If yes: see instructions on reverse
  • If no: if more than 1 week has elapsed, contact [Disguised]

* Printed double sided; the page is flipped over as applicable.
Appendix 8: Franchise Book Kanban Log

Filing Cabinet

LOG:

Another log on other side!

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Franchise Book or Supervisor Standard Work?</th>
<th>Number of copies remaining</th>
<th>Binder order placed?</th>
<th>Repro order placed?</th>
<th>Notes</th>
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<td>Sample: John Smith</td>
<td>1/1/08</td>
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<td>6</td>
<td>Yes</td>
<td>No</td>
<td>Binders will arrive 1/3/08.</td>
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</tbody>
</table>

New logs: Franchise Book|Trackers and Improvements|Hardcopy Kanban