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From Technological Triage To Maturing A Collaborative Environment

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ABSTRACT ~

Technology Service Organization (TSO) is responsible for a portfolio of information management systems that support enterprise-wide business functions for the United States Marine Corps (USMC). Coordinating the management and administration of these mission critical systems requires daily communication and collaboration. Faced with splitting a once collocated organization that relied heavily on file sharing, TSO created a portal that shared documentation and provided access to various software management applications and external links. The initial implementation of Microsoft Windows SharePoint Services 3.0 was leveraged as a technological triage and had the effect of creating a common operational framework for the TSO. Enhanced functionality would mature as time and resources allowed. The subsequent migration/upgrade to SharePoint 2010 provided for an opportunity to reevaluate the collaborative environment and internally review the lessons garnered across eight divisions. The subsequent implementation naturally had the expectation of yielding superior results with increased functionality expected of software maturation.

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At the end of 2010, U.S. Chief Information Officer Vivek Kundra released a 25 point implementation plan to reform federal information technology management.[1] How organizations embrace collaboration, shared awareness, and decision-making links the critical elements of this mandate to achieve operational efficiency and to effectively manage large-scale information technology programs. Under this mandate, Technology Service Organization (TSO) is responsible for a portfolio of information management systems that support enterprise-wide business functions for the United States Marine Corps (USMC), primarily the Marine Corps Total Force System (MCTFS) and the MCTFS Family of Systems (FoS) which includes the Standard Accounting, Budget and Reporting System (SABRS). MCTFS, the USMC's integrated military pay and personnel system, processes in excess of 17 million transactions and $5.712 billion in payments annually. SABRS, the official accounting system for the USMC, processes 35 million transactions and manages $57 billion in funds annually. Coordinating the management and administration of these mission critical systems requires daily communication and collaboration between the various operational units and their internal and external customers.

TSO, through an accelerated implementation of Microsoft SharePoint, has fostered an intuitive graphical user interface to a robust information sharing environment where technologists, administrators, and TSO clients can effectively collaborate worldwide. The Capability Maturity Model Integration for Development (CMMI-DEV) for TSO as a software development organization is reflective of the organizational culture; and provided inspiration, understanding, and cooperation for the need to assess processes, improve performance, and mature internally. Adherence to this framework yielded unexpected value-added to the SharePoint migration efforts as both a catalyst and a leverage point for organizational buy-in. By optimizing permission

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[1] 25 Point Implementation Plan to Reform Federal Information Technology Management, Vivek Kundra, U.S. Chief Information Officer. Steven VanRoekel, the current U.S. Chief Information Officer, has aggressively continued information technology reform and delivered on 18 of the 25 deliverables with 5 remaining on track and only 2 being reported as behind schedule. As of 21 March 2011 ref: http://www.cio.gov/modules/itreform/ Dec 9, 2010

handling and restructuring our current portal, TSO has adopted best practices that coincide philosophically with an effective implementation of the Capability Maturity Model Integration for Development.[2]

Currently, the TSO is divided almost evenly between two geographic sites: TSO Indianapolis, Indiana and TSO Kansas City, Missouri. The organization is composed of eight divisions and a headquarters staff consisting of over 500 Marines, government employees, and contractors. Day to day interactions are handled through video teleconferencing, e-mail, and telephone calls, with the primary tool for documentation, collaboration, and program management being facilitated through a common web portal.

> *TSO is at the tip of the technological spear ensuring continuous, responsive, and effective military pay, accounting, budgeting, and centralized, automated, and virtualized personnel information technology support for the United States Marine Corps. This requires daily collaboration and the ability to capture and document the progression of thought as we provide planning, architectural guidance, innovation, and the supporting infrastructure for enterprise-wide business functions.*
>
> *~ Clint Swett, Director TSO*

Originally, the TSO was under one roof. The need to expeditiously implement a solution to migrate a somewhat fragmented heterogeneous environment of shared drives became a priority due to a congressionally mandated Base Realignment and Closure requirement which resulted in the need to migrate from the Defense Finance and Accounting Services network. Creating a common portal for various software applications was accelerated for a once collocated organization which was being split evenly between two work sites. The desire to synchronize

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[2] CMMI models are collections of best practices that have been developed by industry experts and the Software Engineering Institute. CMMI-DEV provides a comprehensive set of guidelines for developing products and services and in this particular context, software development. Congruent and apropos to the subject at hand, because the TSO has implemented the CMMI as their software development framework model and is committed to endeavors impacting integration and improvement. Currently, two of the TSO's leading divisions are at CMMI Level 3 with the remaining applications divisions at Level 2. The TSO is scheduled to sit for Standard CMMI Appraisal Method for Process Improvement (SCAMPI) appraisals May/June of 2013 with the goal of attaining the next level.

efforts across multiple time zones and interact with a customer base that stretched the globe was further justification to pursue a more robust solution. Creating a portal that not only shared documentation but also provided access to various software management applications and external links had the effect of creating a common operational framework for the TSO. Another benefit would be expanding the mechanism for how file access and permissions were granted to individual users. In support of this effort, the TSO director issued a series of memorandums to facilitate continued and smooth functioning of this government owned, government operated, contractor supported model.

Design of the TSO Information Environment

In system engineering it is understood that design is critical; compromise any part of a design and you risk compromising the entire system. The initial implementation of Microsoft Windows SharePoint Services 3.0 (WSS 3.0) was leveraged as a technological triage to immediately address file storage access and sharing. A conscious choice was made to embrace an expedited implementation with the understanding that enhanced functionality would mature as time and resources allowed. The subsequent migration/upgrade to SharePoint 2010 provided for an opportunity to reevaluate the collaborative WSS 3.0 environment and internally review the lessons garnered across the eight divisions. The subsequent implementation naturally had the expectation of yielding superior results with increased functionality expected of software maturation. TSO systematically evaluated the current iteration through a series of formal reviews of critical components of design, namely:

- Information Architecture
- Content Modeling and Content Type Definitions
- Metadata Schemas and Search Relevance
- Taxonomy Management
- Managed Administration

Information Architecture

Information architecture in this context is the blueprint used to organize information in a manner that is intuitive for users to find. "Information management addresses information as a commodity instead of a technology and is performed at all levels, regardless of the extent of automation."[3] The information architecture helps ensure that the information commodity is properly organized for effective and efficient consumption. A dynamic comparison of recommended thresholds demonstrated that the current implemented environment exceeded that of best practices.[4] The TSO capitalized on the opportunity to address the powerful enhancements of SharePoint 2010 and map them against the internal and external business goals; namely project and process collaboration, business intelligence, access to organizational assets, and convenient hyperlinks to application tool sets and external references. Enhanced functionality such as synchronization of specific documents with the email client, RSS feeds[5], and e-mail alerts as implemented by the various divisions was further exploited. While unintentional, the information architecture also had the added benefit of revalidating previous assumptions of business processes within TSO.

Content Modeling and Content Type Definitions

Content modeling is the process of organizing content into logical groups called content types. Under the original implementation of SharePoint, TSO created a top-down hierarchy with each division and staff section utilizing sixteen top-level sites with multiple subsites. TSO created a unique 'Document Management System (DMS)' library which housed policies and procedures that had broad application to the organization. Divisions, however, created ad hoc structures resulting in the majority of content being stored in the default 'Shared Documents' libraries.

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[3] Marine Corps Warfighting Publication 3-40.2 Information Management 2002

[4] *SharePoint 2010 Usages Best Practices* | Microsoft White Paper; apropos as the adopted environment being migrated to.

[5] RSS feeds formally defined as 'RDF Site Summary (Resource Description Framework)' has adopted the colloquial parlance of Really Simple Syndication. Within the TSO portal users subscribe to automated notifications when site content updates.

Simply put, this "default" library had no distinctive naming convention [Policies versus Shared Documents] related to the type of documents or files being stored or any additional folder structure that might have further categorized the type of documents or files. Initially, search features within the information environment were disabled for security reasons, having the effect of forcing 'users' to visually (physically) scan through every artifact in a given library in order to locate the desired content. The majority of shared document libraries contained thousands of documents with multiple versions existing in numerous locations due to the creation of unrestricted silos. Exacerbating the environment was the absence of workflows for the metadata to provide logical content handling and management. During this phase of the assessment it became apparent more needed to be done in the area of Content Modeling to prepare for the implementation of SharePoint 2010 feature enhancements, especially in the areas of content management and business information intelligence.

Metadata Schemas & Search Relevance

Leveraging SharePoint superiority as a content management system requires a systematic approach to designing and implementing a logical taxonomy i.e. system of organizing, cataloging, and tagging information. Search engines are typically designed to use metadata schemas and taxonomies which provide control over how information is defined and accessed. The search engine functions through indexing content by identifying attributes/properties (metadata) which is predefined by the content.[6] A severe limitation of the initial environment was the intentional disabling of the search engine in order to prevent unauthorized users from accessing content. In the 2010 implementation, security concerns were mitigated by the practice of "security trimming" content, which is known in common parlance as assigning permissions for those that should have access rights.

Utilization of proper document tagging with appropriate metadata decreases the time to search and gather critical information. SharePoint 2010 Enterprise presents a much more robust approach to this process with the introduction of document types, document sets, and external

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[6] "Metadata improves the ability to serendipitously discover what is available in a content repository - it surfaces rather than buries content." *SharePoint 2010 Usages Best Practices* | Microsoft White Paper

content types. As the first step in enhancing the existing metadata schema, TSO has also adopted the metadata baseline known as the Simple Dublin Core Metadata Element Set (DCMES)[7] which consists of three categories: content, intellectual property, and instantiation divided between fifteen metadata elements:

Content	Intellectual Property	Instantiation
• Coverage • Description • Relation • Source • Subject • Title • Type	• Contributor • Creator • Publisher • Rights	• Date • Format • Identifier • Language

Taxonomy Management

Subject matter expert Susan Hanley[8] highlights that a key element in efficient taxonomies is organizing information functionally with the end user in mind. Furthermore, she cautions that redundancy in a taxonomical sense creates a confused environment. Taxonomy should not be approached as a static process; rather, there is a need for periodic taxonomical review and governance of content management. Moreover, policies and processes must be created that include a feedback mechanism for improvement and corrections. Additionally, devising an archiving strategy that addresses the most relevant historical information prevents unneeded, unwanted, or duplicative content appearing in the search results.

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[7] The Simple Dublin Core Metadata Element Set has been endorsed in International Organization for Standardization (ISO) Standard 15836-2009 for information and documentation.

[8] "Everything You Ever Wanted to Know about Taxonomies … but were afraid to ask." Susan Hanley, LLC www.susanhanley.com

Development of governance guidelines for the TSO is a major factor in ensuring enforcement of taxonomy management best practices. Without governance it will become virtually impossible to manage administration.

Managed Administration

Absent from the initial implementation was tightly managed administration, which resulted in roles and responsibilities being handled ad hoc. Users creating a multitude of unnecessary subsites with an improper understanding of how to assign permissions resulted in an implementation akin to a "Field of Dreams" with the subtext, "If we build it, they will come." And come our technologically savvy user base did, modifying and creating structures and sub-structures without any formal guidance. The TSO SharePoint expert became a defacto information management officer[9], creating an information management plan for the organization.

Implementation of the TSO Information Environment

Before moving forward with either an upgrade or rebuild to the SharePoint 2010, a review of threshold limitations would need to be conducted and the use of a system administration operation referred to as 'pre-upgrade checker' would have to be performed.

Threshold Limitations

Recommended threshold limitations in areas of performance included: size of the content database, use of only one site collection [web site] for the web application, the number of

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[9] An empirical review of 2011/2012 After Action Reports in the Marine Corps Center for Lessons Learned using the keyword 'SharePoint' revealed two themes. First, the desire for an information technology solution to transmit and receive dispositions in a single, unified system with controlled permissions, work flows, etc… Second, when SharePoint was adopted as the 'solution' the requirement of assigning an information management officer was identified as a critical component of success. https://www.mccll.usmc.mil After Action Reports included operations in Afghanistan, Pacific and European Theaters, and the United States.

subsites, number of lists/libraries, and library performance. The results of this WSS 3.0 threshold review are displayed in the table below:

Size	• Microsoft recommends a site collection content database not to exceed 100 GB of content • TSO portal consisted of a single site collection content database that contained 300 GB of content
Subsites	• Microsoft recommends no more than 2,000 subsites per web site • TSO contained 5,216 subsites
Lists	• Microsoft recommends no more than 2,000 lists/libraries per website • TSO website contained 78,473 lists/libraries
Library Performance	• Microsoft recommends performance optimization at 2,000 items per library/list view • TSO libraries exceeded 3,000 - 5,000 items per library/list view

Pre-upgrade Checker

The 'pre-upgrade checker' discovered fatal errors for both the database schema and the SharePoint configuration and identified an unacceptable number of failures due to orphans. When third party tools are introduced into the SharePoint environment, they have the potential to install assemblies, features, and templates. If an improper uninstall is performed, certain elements of the assemblies, features, and templates remain in the content database and, in Microsoft vernacular, become an "orphan." TSO third-party tools were reloaded without proper uninstalls, leaving behind enough orphans to error out the pre-upgrade checker, resulting in an unstable environment.

Armed with the above analysis, TSO decided to forego upgrading the WSS 3.0 environment and to rebuild the entire instance from the ground up in SharePoint 2010 with a mature and well defined information architecture in place. Cliché comments and criticism might lend themselves to the above situation. More apropos perhaps is the realization that a technologically advanced organization that is residence to a large community of data systems and software engineers is not immune to less than optimal implementation of any given software tool. SharePoint was viewed as a common web interface for accessing documents, blogging, linking to applications and external sites. With that focus, SharePoint served its intended function beyond the previous environment of accessing files on shared drives and e-mailing documents back and forth as the mechanism for collaboration. With increased expertise, the TSO would take advantage of the broader functionality of SharePoint, utilizing many of the new enhancements and feature sets, and benefit from a more robust understanding of the collaboration tools, workflows, and tighter architectural framework in place.

Usage Audit

In preparation of a full rebuild and restructure of the existing SharePoint environment, an audit of all securable objects (subsites, libraries and lists) was performed and documented. Because TSO is composed of a technologically sophisticated user base, a summary regarding improper permissions handling with a review of best practices was incorporated into several training evolutions tailored to the needs of the divisions. A snapshot of the number of items per list/library, and length of time since accessed was provided, allowing for a methodical approach to deciding relevancy of structure and to review archiving strategies.

The audit confirmed that SharePoint was being used as a broad collaboration tool with primarily application requirements/design, systems, hardware/software, security, process/end user, customer, and project/task content being stored. Opportunities for site optimization were highlighted and tagged and much of the content was either consolidated or eliminated with special attention given to unnecessary redundancy.

During audit discussions with site owners the following was reviewed:

- What is the purpose/scope of the site collection, sites, subsites, and content?
    - Determining the purpose/scope is important for a number of reasons, but first and foremost it provided the starting point for all governance policies. The broader the collaboration audience the stricter the governance.
    - An understanding of the purpose/scope was important when determining what content could be less structured, needed ongoing management, and needed to be excluded from search. This helped to identify what areas and content would require a stricter information architecture[10] and classification scheme.
- Stakeholder's perspective was further elaborated through a series of interviews and working groups. The following represents a sample of questions used which aided in developing the requirements for our new information architecture:
    - Who are the key users?
    - Will there be a need for opening up the portal to external users or will information only be consumed by the organization?
    - How will stakeholders access and use the information?
    - Who are the content creators and how will governance drive what content is created?
    - Will certain content need to be identified as records?
    - What policies will need to be created to govern the management of content throughout its lifecycle?
- Security policies needed to be established not only for governance but in order to create a best practice, role-based methodology for permissions handling. The following audit exercise helped determine where content would be published and how security would be determined.

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[10] "Information architectures should be driven by purpose. A well-designed ontology (where information is stored) and taxonomy (what it is called) increases the likelihood that users will find what they are looking for with minimal clicks. An effective information architecture is a tool that will assist users in understanding and interacting with the solution." Essential SharePoint 2010, Scott Jamison, Susan Hanley, Mauro Cardarelli; The Addison-Wesley Microsoft Technology Series; Copyright 2011 Pearson Education, Inc.

o We identified and documented what content needed to be secured strictly at the top-level of the division/branch site collection. This content would be open to a large audience of internal and external users. Permissions handling was created to support this in a read-only role.

o We identified and documented what content required tighter restriction than the site collection level offers and should be confined in subsites. This content would be open only to division heads, or branch heads, or collaborative team members. We broke permissions from the parent-level and created permissions handling to support this in a read-only, contribute, manage and owner role.

o We identified and documented library and list content that would require tighter restriction than the site level offered. This brought focus to the cross functional groups with limited access to specific libraries, lists or individual documents. We broke inheritance from parent subsite where libraries and lists resided. The necessary role-based permissions would be determined on a case-by-case basis.

This process of evaluation allowed us to effectively plan and implement an information architecture and site architecture that could evolve as organizational and user needs change. This information served as the baseline for policies and standards that were the foundation of governance. Permissions handling was streamlined by identifying upfront the various security groups that would need to be created for the purpose of granting users access.

Level of Security

The final step in this process was to determine if the level of security assigned to the content warranted removing it from search indexing all together. This eliminated the possibility that any results returned from a keyword search would make reference to or provide a link to this content. Security trimming prevents access if a link is clicked, but removing it from search all together means that unauthorized individuals would not even know the content existed in SharePoint.

Governing the TSO Information Environment

Information Management

Organizing information in SharePoint should not be approached from the perspective of one individual, but rather the team or group. Simply stated, information should be structured for ease of access. The process of optimizing the environment includes reducing the number of 'click throughs' necessary to arrive at the objective of the search. In the evolutionary chain of knowledge management, the question should be asked, "Does the arrangement yield to intuitive wisdom of the team?"

> *SharePoint is a highly effective tool for content and knowledge capital management; this tool greatly enhances the collective knowledge base while concurrently improving our ability for knowledge transfer between members of the TSO/CSC integrated product team. Paraphrasing an old expression, SharePoint performs the digital alchemy that transforms data into information which becomes knowledge which becomes wisdom that ultimately helps us to better understand the complexities of the informational environment in which we operate. ~ Gary Hayes, Director CSC*

 The second aspect of this question regards potential for information overload, it is the design aspect of how information is displayed and for those familiar with John Boyd's[11] work answers, "Does the cockpit design lend itself to efficient decision-making?"

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[11] With the availability of data/information and an ever evolving environment of accelerating technological change, there's the issue of drinking water from a fire hose and the challenge of avoiding information overload. Colonel John Boyd (USAF) is credited with solving the dilemma of too much information in the cockpit {**SharePoint**}. In short, our fighter pilots had superior information systems but were being shot down by inferior platforms because the enemy was coming to a quicker decision and pulling the trigger faster. Boyd's solution was to define and then measure the time any given system took for the operator to arrive at a decision. Making conscience decisions to retool collaborative environments to be intuitive pays homage to Col Boyd's underlying philosophy.

Not unlike Microsoft Excel spreadsheets, SharePoint leverages the advantage of using fields to define sortable columns when accessing content sharing a common project name, date, or authorship. Used wisely this prevents the unnecessary use of redundant folder names. A skilled SharePoint administrator in the role of information manager helped the TSO navigate this functionality.

Optimizing the Information Environment

To leverage the strength while concurrently maturing functionality of the collaborative environment every member of the TSO continued to be a stakeholder in the process. Since the divisions had unique approaches and levels of maturation in their existing use of SharePoint; time was taken to annotate what had become the adopted practices of the organization. The role of the SharePoint information architect became one of having full cognizance of how the platform was used and could be leveraged to accomplish business objectives. The determination of how content flowed across the TSO as an organization was resolved by:

1. Identifying where content was created and where it would be used
2. Identifying all cross functional teams that needed to share the information
3. Identifying content owners and who needed access
4. Defining metadata and managed content types

Once this was determined re-planning the site collection and subsite structures so that information would be available to internal users and external customers was added to the design and implementation process which was decomposed and outlined. This allowed the SharePoint information architect to determine how content could be separated and grouped according to process, projects, roles, and organizational functions. A formal architecture diagram was based on the following findings.

1. Site Hierarchy and Navigation
    *   Global or Top-Level Navigation would be comprised of links to all Divisions, certain branches and some cross functional groups

- Quick Launch Navigation would be comprised of links to all remaining top-level subsites for branches, and other organizational groups that require limited or restricted access
- Further break down of navigation was determined by user-friendly access methodology and testing before implementation

2. Content Authoring and Approval

- Discussions with various working groups and project leaders provided a road map for where workflows would need to be created and what action steps would be required

3. Audiences

- Discussions with organization, division, and branch level power-users helped determine what type of audiences would need access and provided the names of groups to create and users that would be added to groups when architecting the permissions handling structure

4. Document Taxonomy

- Discussions with major content owners and creators established the content model for development of document sets, content types, and all forms of metadata

Conclusion

TSO's goal is to provide a mechanism for refinement of tasks, procedures that will lead to continuous improvement of processes and procedures. To wit:

> *To evolve the Corps into a Knowledge-based Force that achieves decision and execution superiority in traditional warfighting domains, Cyberspace, and business mission areas, investments in core [Marine Corps Information Enterprise] components are crucial. Investments for the Marine Corps Enterprise Network and the Marine Corps Information Technology Environment will focus on ensuring their ability to more effectively deliver, display, and manage data, information, and knowledge across the enterprise.*[12]
>
> *Brigadier General Kevin J. Nally*
> *U.S. Marine Corps, Director C4, Chief Information Officer, and*
> *Deputy Commanding General Marine Forces Cyber Command*

Piloting the new information environment which included explaining the taxonomy and expected user experience was an incremental process. With new governance in place, roles and responsibilities were reiterated in a series of classroom sessions and hands-on demonstrations. With the ongoing support and acceptance of the governance initiative, the overall health and stability of the TSO portal environment has been greatly enhanced. Training has shifted from the overall end-user community to a more focused path that provides site owners and content managers with the tools to assume more responsibility for expansion and maintenance of taxonomy. As user proficiency increases, elements not found to be user-friendly or provide substantial benefit will be refined or revised.

The benefits of this well structured information architecture will serve to ensure:

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[12] USMC C4 Strategic Documents Compendium 1 July 2011 Version 1.0 which is comprised of: 1) The Director C4 Vision and Priorities, 2) The Marine Corps Information Enterprise (MCIENT) Strategy, 3) The Director C4 Roadmap and, 4) The C4 Strategic Communications Brief

- Central access to information and knowledge
- "One version of truth" vital for successful records/document management
- Enterprise-wide support for access to information and knowledge through the development of content standards
- TSO continues to build on the strategy of sharing and collaboration

The TSO's Management Steering Committee endorsed these efforts and provided the platform for building awareness and acceptance of the new information architecture being implemented across the organization.

Acknowledgement