

AIR WAR COLLEGE

AIR UNIVERSITY

**DEVELOPING A SITUATION AWARENESS ENVIRONMENT
FOR THE DISTRIBUTION PROCESS OWNER:
RECOMMENDATIONS FOR UNITED STATES
TRANSPORTATION COMMAND**

by

James Michael Doolin, YC-3, DAF Civilian

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Advisor: Col Alvin M. Lowry, Jr.

Maxwell Air Force Base, Alabama

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Contents

	<i>Page</i>
Disclaimer.....	ii
Biography.....	v
Abstract.....	vi
Introduction.....	1
Background.....	5
The Importance of Information Confidence.....	6
The Critical Path to DPO Situation Awareness (SA).....	8
DOD Critical Path Considerations.....	9
USTRANSCOM Critical Path Discussion.....	10
Senior Leader Buy-In and Staff Advocacy.....	10
Ownership of Processes Information, and Business Rules.....	10
Adopting a Knowledge-Centric Approach to DPO Culture.....	13
Analysis of Situation Awareness Research.....	14
Why User-Centered Design and SA Oriented Design Principles?.....	15
If Not User-Centered Design, Then What Should Be the Focus?.....	17
Recommendations for DPO Situation Awareness (SA).....	18
Leverage SA Industry Research and Adopt User-Centered Design Principles	18
Adopt a Knowledge-Centric Approach: Processes, Information, and Business Rules	19
Address Critical Path Concerns for DPO SA in Appropriate Governance Forums.....	20
Conclusion.....	20

Abbreviations.....22

Bibliography.....23

List of Figures

Figure 1. Incorporating Information Confidence Factors for Situation Awareness.....2

Figure 2. DPO SA Decision-Making Model.....3

Figure 3. Relationship of Information Confidence to Decision Risk-Level.....7

Figure 4. Example: Business Rules and Information Tag.....13

Biography

Mr. James Michael “Mike” Doolin (M.S., Central Michigan University), is currently an AY10 student at Air War College, Maxwell Air Force Base, Alabama. In his previous assignment he was Chief of the CIO Support and Distribution Portfolio Management Division, Command, Control, Communications and Computer Systems Directorate, United States Transportation Command (USTRANSCOM), Scott Air Force Base, Illinois. As Division Chief, he was responsible for leading USTRANSCOM Chief Information Officer (CIO) support and management of the DOD Distribution Information Technology (IT) systems portfolio; ensuring it supported Commander, USTRANSCOM’s vision, mission, and goals in his role as the DOD Distribution Process Owner; leading effective and efficient delivery of compliant capabilities for the warfighter, while maximizing enterprise return on IT investment.

Mr. Doolin is also a Lieutenant Colonel in the USAF Reserve, serving as a Deputy Operations Center Chief in the J3 at USTRANSCOM. Prior to this position, Lieutenant Colonel Doolin served two years on active duty (March 2003 – April 2005) as a Joint Mobility Operations Officer working in the Current Air Operations Branch of the USTRANSCOM Operations Center. These assignments have enabled him to gain experience and insights into the daily operations of USTRANSCOM as the Distribution Process Owner.

Mr. Doolin’s combined civilian and military career spans over thirty-four years of federal service within the Information Technology and Logistics professions, including both line and staff assignments which ranged from Squadron and Group level as a traditional guardsman with the Hawaii Air National Guard, to Combatant Command level as a civilian at both United States Pacific Command and United States Transportation Command.

Abstract

On September 16, 2003, the Secretary of Defense designated the Commander, USTRANSCOM as the Distribution Process Owner (DPO), charged with the responsibility to coordinate and synchronize execution of the DOD distribution system. In this context, distribution process is defined as “the networks, relationships and procedures used by the Department of Defense to control the flow and distribution of military forces and materiel between the point of receipt into the military system and the point of issue to using activities and units.”¹ Additionally, on 28 July 2004, USTRANSCOM was given the responsibility for managing the Information Technology (IT) Portfolio associated with its DPO mission.² Executing its new role as Distribution Portfolio Manager (DPfM), USTRANSCOM acted upon a requirement from the November 2005 Council of Logistics Directors Conference and moved forward with the DOD logistics community and the Defense Information Systems Agency (DISA) to provide a Common Operating Picture (COP) for Deployment and Distribution (D2). During the fall of 2007 and spring 2008, DISA fielded an initial operating capability for COP D2 on its unclassified and classified Global Combat Support System-Joint (GCSS-J) web portals.

As such, historically the term COP D2 refers to a materiel IT solution that was undertaken by the DPO in 2006. However, this research is focused on the broader environment required for successful DPO situation awareness (SA). Today, as functional proponent of a future DPO SA environment, USTRANSCOM is searching for best practices to provide visual and tabular supply-chain information necessary to execute DPO operations. This paper addresses holistic recommendations (beyond technology) for consideration as USTRANSCOM looks for effective ways to improve its information environment in support of its DPO mission.

Introduction

This paper will focus research and recommendations by asking three basic questions: (1) what should be the end-game objective for DPO Situation Awareness (SA)? (2) what is in the critical path to achieve the objective? and (3) how does the DPO get to the objective end-state? The following is provided as a start to answering those three questions. Successful SA for DPO decision-makers requires confidence in the information to enable effective DPO decisions. Integral to this trusted environment is the requirement for accurate, timely, and relevant information;³ subsequently leading to confidence and actionable decision-making. In turn, decisions based on confidence in trusted information lead to effective and efficient logistics actions being taken in support of global DOD operations. Therefore, USTRANSCOM should pursue information confidence as the end-game objective for DPO SA. That assertion leads to this paper's thesis that *the DPO should articulate the need for information confidence as its fundamental requirement for an effective and successful SA environment*. Considering information confidence as its primary objective will drive the DPO to understand all of the necessary critical path elements to achieve success.

Finally, addressing "how" the DPO reaches its objective, this paper will provide three macro-level recommendations for USTRANSCOM: (1) leverage pertinent SA industry research and adopt user-centered design as the foundation for a DPO SA environment, (2) adopt a knowledge-centric approach to DPO culture by defining ownership of information, processes, and business rules, and (3) address critical path concerns for DPO SA through appropriate governance forums. To better understand the importance of the three macro recommendations, this paper will highlight the need for the DPO to advocate development of information confidence factors as a micro-level recommendation for its SA environment.

As a reference point, the following is provided as a basic definition of information confidence factors: a visual, audible, or textual indicator that communicates a level of confidence (low, medium, or high - based on appropriate business rules) for a given element of situation awareness information. The basic business rules associated with information confidence factors should be based on providing timely, accurate, and relevant information to the decision-maker.⁴ (See Figure 1. Incorporating Information Confidence Factors for Situation Awareness below.).

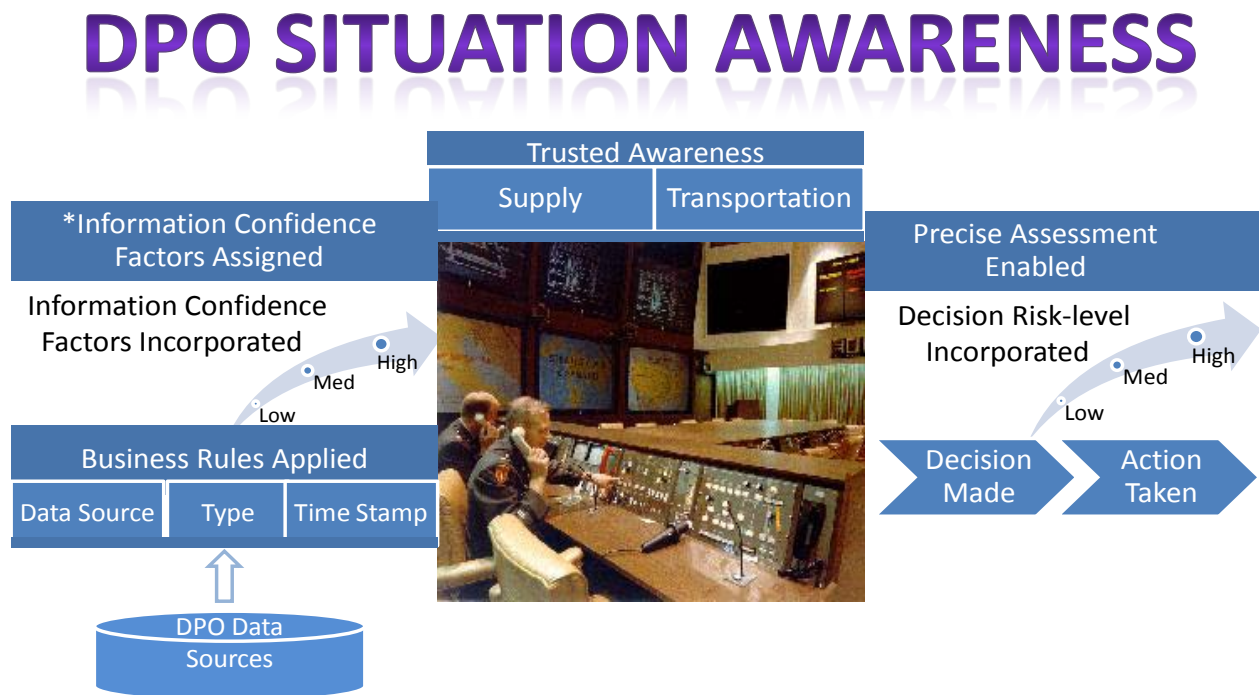


Figure 1. Incorporating Information Confidence Factors for Situation Awareness

There are many other key elements that should be addressed to achieve the desired end-state of information confidence. This paper will briefly introduce these elements, while focusing in detail on the key component of information confidence factors. The importance of this focus is predicated upon understanding the basic process of decision-making within the DPO SA

environment. The case will be made that information confidence lies within the critical path of successfully providing actionable (decision-ready) information, and therefore should be an integral part of any best practice driven solution (See Figure 2. DPO SA Decision-Making Model below.).

DPO SITUATION AWARENESS

- Processes
 - Defined
 - Disciplined Execution
- Personnel
 - Trained
- Organization
 - Leader/Staff Buy-in
 - Knowledge-focused
 - Ownership: Process, Rules Information
- Information
 - Confidence Factors
 - Accessible, Timely
 - Accurate, Relevant

Key Decision-Making Elements

- Combat Operations
- Security Cooperation
- Humanitarian Assistance

Figure 2. DPO SA Decision-Making Model (* Information Confidence is the first step.)

This research provides recommendations for USTRANSCOM leaders to consider as they embark upon a major business transformation effort for the Command called Agile Transportation for the 21st Century (AT21) and rolls out IT-enabled capabilities as part of its Corporate Services Vision.⁵ The DPO SA environment will be integral to successful realization

of the AT21 vision. USTRANSCOM Commander, General Duncan J. McNabb provided the following as part of a March 27, 2009 statement before the Senate Armed Services Committee:

“When fully operational AT21 will provide the warfighter full distribution pipeline visibility and enable throughput management at critical ports and waypoints around the world.”⁶

Undoubtedly, the success of AT21 will be dependent upon confidence in the underlying information.

Background

This paper will leverage specific research centered upon designing for situation awareness and human factors engineering as the basis of its recommendations for USTRANSCOM. As a further clarification of reference for this discussion, one should consider that the distribution process is part of the greater domain of logistics within DOD. As such, logistics-centered topics are directly relevant to the DPO discussions herein. Additionally, a basic definition of situation awareness will be introduced to establish the baseline discussion. There are at least 26 SA definitions according to a 2001 systematic classification of SA definitions by Breton and Rousseau.⁷ The well-known Endsley (1988, 1995) definition is used herein: “the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future.”⁸

This translates well for the DPO environment and the capabilities envisioned for AT21 discussed above. Consider Endsley’s definition of SA as it relates to the capability of AT21 to provide distribution pipeline visibility and enable throughput management. “The perception of the elements in the environment,” relates well to visibility of assets within the distribution pipeline such as material supplies, transportation conveyances (a ship, plane, truck, or railcar), supply depots, and ports of embarkation and debarkation. “Within a volume of time and space,” translates nicely to the location of a transportation conveyance and timeliness of the relevant information to enable through-put management of people, equipment, and supplies. And finally, “the comprehension of their meaning and the projection of their status in the near future” enable

visibility and planning for throughput management by reporting whether the item of interest is expected to arrive early, on-time, late, or not at all.

The Importance of Information Confidence

One of the keys to successful logistics planning and execution lies in the need for actionable information. However, for information to be actionable, the decision maker should be confident in the information that is being presented for a decision. Confidence is fundamentally achieved when the decision-maker accepts that the information being acted upon meets the requirements of timeliness, accuracy, and relevance. To deliver these requirements for decision-makers, it is necessary to develop and present information confidence factors in the SA environment (high, medium, or low confidence factors). As a result, the decision-maker can consider a level of risk (low, medium, or high) associated with the decision to be made. Then one can decide based on the confidence and risk levels, whether or not to make a decision that will lead to a subsequent action being taken. Considering the importance of information confidence in the decision-making process leads one to deduce that information confidence factors are in the critical path for the Logistics decision-maker. Therefore, information confidence factors should be addressed as part of the solution to provide situation awareness for USTRANSCOM. (See Figure 3. below.).

DPO SITUATION AWARENESS

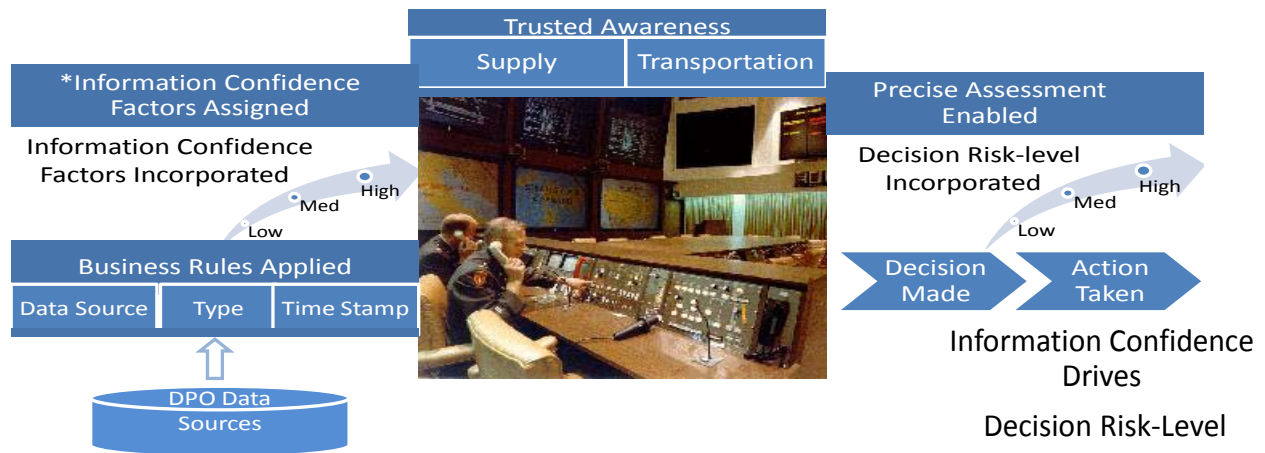


Figure 1. Incorporating Information Confidence Factors for Situation Awareness

Low Confidence	High Risk
Medium Confidence	Medium Risk
High Confidence	Low Risk

Figure 3. Relationship of Information Confidence to Decision Risk-Level

To better understand the importance of information confidence, consider the example of a key logistics decision affecting the safety and lives of our warfighters during Operation Iraqi Freedom.⁹ In 2004, enemy threats were evolving as insurgents strategically placed improvised explosive devices (IEDs) along roads travelled by US forces. The interim solution to help counter that threat was to ship add-on armor for installation on US forces vehicles in Iraq. The planners in the Joint Operations Center at USTRANSCOM were working diligently with their counter-parts at USAF’s Air Mobility Command (AMC) and the Army’s Military Surface Deployment and Distribution Command (SDDC) to ensure the most expeditious shipping solution (air and/or surface). In this case, although planners were leveraging all of their IT

systems capabilities, there was no automated way to indicate a level of confidence in the information associated with timeliness, accuracy, or relevance. As a result, there was conflicting information available and much of it was being validated verbally by a “human in the loop” prior to final decisions for shipment to Iraq by air or surface were made. Traditionally, critical logistics decisions have been made only after checking and double-checking information gained from the various IT systems available across the Department, followed by verbal confirmation on the agreed upon information from all parties involved.

By implementing information confidence factors associated with corresponding risk levels, decision-makers can focus attention on the most critical decisions, trusting business-rule based software to provide confidence and risk levels versus having to manually engage in the process themselves every time. The bottom line benefit to users is that they can allow software to perform confidence checks (starting with the least critical decisions). In turn, that will free decision-makers to perform more critical analysis for the higher risk decisions. Therefore, it is necessary for USTRANSCOM to define, develop, and field the capability to display information confidence factors leading to trusted situation awareness and effective logistics decision-making.

The Critical Path to DPO Situation Awareness (SA)

How does the DPO get to the objective end-state of information confidence? To answer that question this paper will briefly highlight other critical path requirements that should be addressed to achieve the effect of information confidence driving effective logistics decision-making. The critical path to deliver actionable or decision-ready information can be looked at as containing DOD-level concerns, as well as those within USTRANSCOM’s direct sphere of influence as the DPO and Distribution Portfolio Manager (DPfM) for DOD distribution.

Department of Defense (DOD) Critical Path Considerations

USTRANSCOM should continue to address concerns with the Office of the Secretary of Defense (OSD), Joint Staff, the Military Services, and agencies like the Defense Logistics Agency (DLA), DISA, and others as appropriate to realize the stated SA environment end-game. Of the many elements external to the DPO, three stand out as basic essentials for success and fall well within the Military Services purview to organize, train, and equip its forces: (1) the need for trained personnel engaged in well defined and understood DOD logistics business processes,¹⁰ (2) a disciplined approach to information gathering and reporting,¹¹ and (3) universal access to information through appropriate fielding of Information Technology (IT).¹²

Focusing on logistics personnel is one of the keys to successful delivery of trusted situation awareness for decision-makers. Therefore, the proper mechanics for conducting the business of logistics should be inherent in training and the impact of short-cutting processes that support logistics visibility should be understood. For example, failing to ensure that cargo is appropriately marked with accurate shipping labels or Radio-Frequency Identification (RFID) tags, causes information gathering and reporting problems within the supply and transportation domains ranging from re-work at the next location, to re-ordering a critical supply item that might be needed for a mission-essential task or operation. Additionally, trained personnel must also have the discipline to ensure timely gathering and reporting of information to enable information confidence for decision-makers and to guard against “the possible loss of life and equipment resulting from poor planning” based on incomplete or inaccurate logistics information.¹³ Along with training and disciplined execution of logistics processes, comes the requirement to ensure complete access to the necessary IT solution that supports execution of logistics duties. Today, access to logistics information via web-enabled services and applications

is very prolific through fielding of capabilities like the GCSS-J COP D2 mentioned earlier. All new IT services should be web-enabled to ensure widest access possible.

The scope of this research does not allow for in-depth discussion regarding the importance of these three DOD-level critical path items or others like them. However, the DPO should pursue their successful accomplishment in order to realize its objective of a successful DPO SA environment. Therefore, the DPO should continue to leverage governance forums like the Distribution Executive Board and Distribution Transformation Task Force to address essential elements within the critical path of providing decision-ready information for decision-makers.¹⁴

USTRANSCOM-Centric Critical Path Discussion

This paper will now focus on some DPO-centric elements necessary for USTRANSCOM to achieve success: (1) senior leader buy-in and staff advocacy, (2) ownership of processes, information, and business rules, and (3) adopting a knowledge-centric culture.

Senior Leader Buy-in and Staff Advocacy

To deliver a future SA environment for the DPO, one should ensure that senior leaders are an integral part of achieving the end-game objective. It is apparent that this is the case, based on General McNabb's statement to the Senate Armed Services Committee that was previously cited. In addition to senior leader buy-in, the power of the entire staff should be focused on the same goals. Success is predicated on a horizontal, integrated team approach to planning and execution of the solution. The days of isolated requirements development and materiel solution design and fielding should be viewed as counter-productive to a successful outcome.

Ownership of Processes, Information, and Business Rules

To achieve the desired confidence in information necessary for logistics decision-makers in a future DPO SA environment, one should first ensure that owners of major business processes and the information supporting those processes is clearly defined and that those identified as responsible are empowered, resourced, and engaged accordingly. For example, who owns the strategic surface transportation process from the strategic seaport of embarkation to the distant end at the strategic seaport of debarkation? One can argue that ownership is split between two of USTRANSCOM's Component Commands, the Army's Surface Deployment and Distribution Command (SDDC) and the Navy's Military Sealift Command (MSC), depending on the type of sealift employed (contract or organic sealift). This is one example of the complexities associated with executing the duties of Distribution Process Owner. However, clearly understanding who owns a business process is critical to determining many other key relationships that are fundamental to the discussion of information confidence.

The process owner should also own the information related to that process and be solely responsible for updating and reporting of that information within the decision-making environment. In the current DPO environment, a user can determine which information source (IT system) to access for logistics information. This can, and does result in different answers to the same question. To eliminate the possibility of this occurrence, an integral first step in the right direction is to assign responsibility or ownership of information to an organization. Subsequent to assigning ownership is to designate an authoritative information source and provide a time stamp associated with currency of the information. This should be done to enable tagging of information and subsequent development of information confidence factors.

Achieving a successful DPO SA environment is also about business rules. The information owner should make information critical to a future DPO SA environment available in a standard way that articulates the confidence level for the information being presented for decisions. The same pertains for the other major process owners in the distribution domain. Airlift transportation information should be the responsibility of AMC; supply information the responsibility of the Defense Logistics Agency (DLA) and the Military Service supply organizations; while information for joint inter-modal transportation decisions should be the responsibility of USTRANSCOM. The information should be “tagged” to indicate high, medium, or low confidence based on a definitive, minimal criteria articulated as business rules.

To understand this concept, consider the following notional example of an information tag for an airlift transportation manifest: (1) type of information: Airlift Manifest, (2) organization responsible and point of contact for the information (Tanker Airlift Control Center; [TACC OpsCtr@AMC.af.mil](mailto:TACC_OpsCtr@AMC.af.mil); 618-229-3131), (3) authoritative information source (GATES), and (4) date/time stamp of last update for the information provided. By providing basic tag information (also known as meta-data) one can next move on to developing the business rules for displaying information confidence factors (See Figure 4. below.).

DPO SITUATION AWARENESS

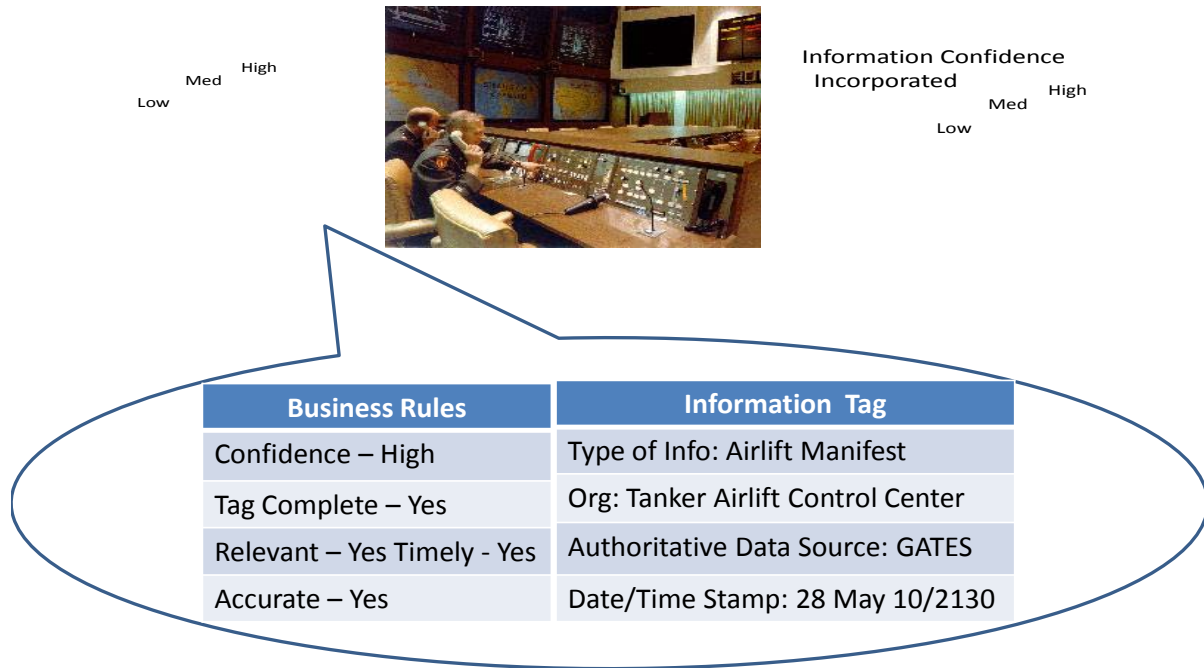


Figure 4. Example: Business Rules and Information Tag

Adopting a Knowledge-Centric Approach to DPO Culture

To realize a trusted SA environment for DPO decision-makers, one should ensure that a culture is fostered that values knowledge as a central theme for success. Along the path to becoming a knowledge-centric organization, are the fundamentals of disciplined information management. These fundamentals include, but are not limited to some of the following basic information management principles. A knowledge-centric organization should tag and categorize information in a standard way, with agreed upon naming conventions in order to be able to discover the information with an automated search-engine. Otherwise, even the most powerful search-engines available will only retrieve unorganized lists of disjointed information. Practicing the fundamentals of disciplined information management is foundational to achieving

information confidence and realizing ultimate transformation to a knowledge-centric organization and culture. None of which can be achieved through technology alone and all of which should be realized to ensure information confidence. The DPO should continue to institutionalize ownership of processes, information, and business rules, in order to fully reap the benefits of a DPO SA environment enabled by technology.

Analysis of Situation Awareness Research

To understand the premise that information confidence is in the critical path of DPO decision-makers, it is helpful to consider the mechanics of the decision-making process within the SA environment (See Figure 1.). The decision-maker is the center of focus in the SA environment. The desired outcome of the model is a trusted decision which then leads to an appropriate action being taken in response to the information being presented. To achieve a trusted decision, the decision-maker must have confidence in the information. The purpose of providing information confidence factors is to enable the decision-maker to proceed based on a visible level of confidence (high, medium, or low), such that minimal re-work is required to validate and/or verify information prior to an ultimate decision being made.

A review of readily available research related to situation awareness led to discovery of several primary references that were very pertinent to USTRANSCOM's request for research related to best practices for a Common Operating Picture (COP) for Deployment and Distribution (D2), i.e. the DPO SA environment. Two references were considered most pertinent for discussion: (1) *Designing for Situation Awareness, An Approach to User-Centered Design* by Mica R. Endsley, Betty Bolte', and Debra G. Jones; and (2) *A Cognitive Approach to Situation Awareness Theory and Application* edited by Simon Banbury and Sebastien Tremblay.

Endsley has performed extensively in the field of Situation Awareness and is president of SA Technologies in Marietta, Georgia. Her area of SA expertise is in aviation, military, and the medical profession. Her work provides a very detailed approach to SA that focuses on the business of the user and providing a holistic SA business solution that guides development through the lens of user-centered design, focusing on determining user requirements, and applying SA-oriented design to the entire system of the mission environment.¹⁵

Banbury and Tremblay have complimented Endsley's work by providing a broader review of SA research. The book entitled, "A Cognitive Approach to Situation Awareness: Theory and Application," features 17 chapters from 41 different contributors. In chapter 17, Endsley is consulted to provide her incites regarding progress and directions for SA, providing a brief 2004 update to her extensive research from 2003. Banbury and Simon look critically at defining and modeling situation awareness. In doing so, they question Endsley's 2003 work as being focused on a more basic descriptive approach instead of a more detailed prescriptive approach. While there may be some validity to that criticism, Endsley's detailed design principles template is an excellent source for USTRANSCOM to perform a comprehensive baseline review of user requirements as it moves to a future DPO SA environment. The Banbury and Tremblay work draws credibility and strength from the contributions of 41 individuals across theoretical perspectives, research approaches, and domains of application.¹⁶

Why User-Centered Design and SA Oriented Design Principles?

Foremost, Endsley's work impresses as a comprehensive design checklist that identifies the user as the appropriate focus, versus driving solutions based on technology as the reference point. It compares user-centered design with technology-centered design, and ends with a

detailed list of 50 design principles that appear to cover a very-grounded approach to addressing requirements for SA design. A review of the design principles reveals six areas of design principles for consideration: general, certainty, complexity, alarm, automation, and multi-operator.¹⁷ To reinforce the value of this list, consider the primary assertion of this paper, that USTRANSCOM should identify information confidence and information confidence factors as a key requirement for its future SA environment as articulated and supported by the proposed DPO SA Decision-making model depicted in Figure 2. The certainty design principles in Endsley's list speak directly to information confidence as follows: (1) explicitly identify missing information, (2) support sensor reliability (e.g. passive and active RFID sensor reliability), (3) use data salience in support of certainty, (4) represent information timeliness, (5) support assessment of confidence in composite data, and (6) support uncertainty management activities. More specifically, Endsley speaks to "as more systems employ classification algorithms, sensor fusion and decision support systems, the need will arise to appraise operators of the reliability or confidence levels of these systems' outputs."¹⁸

One inclined to disagree with the need for information confidence factors will possibly cite the Net-Centric Data Strategy that identifies an unrealized goal within DOD to introduce information pedigree as part of the overall data strategy for the Department.¹⁹ Many of the standards or strategies for data in the DOD have been "all or none" propositions. As a result, these strategies have arguably led to shortfalls in expectations due to the enormous amount of work required to engineer information pedigree into the DOD data environment. The recommendation herein for implementation of information confidence factors focuses on only relevant data. In other words, USTRANSCOM should leverage the power of user-centered design to identify the relevant data or information that is necessary to provide the most pertinent

SA for its decision-makers. The application of information confidence factors should start with the relevant information that is valued most by USTRANSCOM and move forward from there based on an appropriate business case that identifies the return on investment. This will preclude much of the discussion with regard to magnitude of effort and feasibility. It will also cause the DPO to consider what information is most critical to its core mission and provide appropriate focus for SA designers.

If Not User-Centered Design, Then What Should Be the Focus?

Some may still argue for a technology-centered design versus user-centered. However, the focus should be on human factors such as processes, information assimilation, business rules, and measuring successful mission outcomes. Reaching the DPO objective is certainly also about technology and the good news is that technology is well matured and deployed in today's web-enabled, connected IT world. Access to information is provided universally via portal technology; geographic visualization is readily provided by mapping tools like "Google Earth"; data warehouses and operational data stores are foundational capabilities in any corporate IT environment; and re-usable web-portlets provide active content for the user experience. The user experience or interface is realized through common capabilities like "iGoogle" where a user can customize the views that are most relevant, e.g. international news, weather, sports, etc.. All of the foregoing is made possible due to the years of foundational code development and subsequent proliferation through re-use in the world of software development. Therefore, while technology is in the critical path for successful fielding of situation awareness tools, it is well matured and readily available for implementation by any fundamentally competent IT organization. Therefore, a technology-centered design approach is not the answer for the DPO. Focusing on human engineering factors associated with user-centered design allows developers

to focus on the important outcomes like information confidence for the decision-maker. And perhaps most critical to success, it places the user at the center of attention and involved from concept to fielding of capabilities.

Recommendations for USTRANSCOM

Research on situation awareness and designing for situation awareness continues to progress and appears to have come a long way in the last ten years. SA research for the military has focused significantly on the command and control domain, but the basic research which is focused on design principles, crosses over very well to the logistics domain. Several reference books are available and have been cited in this paper. Based on this research, the author's personal experience associated with USTRANSCOM operations, and its information technology programs, USTRANSCOM is at an opportune juncture to be able to benefit from the extensive work that has been done by many in the SA profession.

Leverage SA Industry Research and Adopt User-Centered Design Principles

The most relevant research for USTRANSCOM to consider at this point in its maturity with DPO SA is that performed by Mica R. Endsley, Bette Bolte', and Debra G. Jones – a book entitled “Designing for Situation Awareness: An Approach to User-Centered Design”. This paper identified information confidence factors as a micro-level recommendation and one of the key elements in USTRANSCOM's critical path to achieving successful DPO SA. Endsley's approach to SA-oriented design is founded on three overarching principles that are recommended as best practices for USTRANSCOM leaders to consider as they continue down the transformation path of the AT21 initiative: (1) organize technology around the user's goals, tasks, and abilities, (2) technology should be organized around the way users process information

and make decisions, and (3) technology must keep the user in control and aware of the state of the system.²⁰ The research offers a comprehensive list of 50 design principles that the DPO should use as the basis for development of its SA requirements and subsequent development of a DPO SA environment. Additionally, the research directly supports the need to address what is termed as certainty design principles leading the DPO to address information confidence and understanding the value of displaying information confidence factors as part of its SA solution.

Adopt a Knowledge-Centric Approach: Define Ownership of Processes, Information, and Business Rules

By adopting a knowledge-centric approach and redefining the DPO culture as being dependent upon trusted information, the DPO will set the tone for taking its SA game to the next level. Again, the DPO should not treat all information as equal in terms of relevance to its mission. As a start, it should determine which information is relevant to the DPO SA environment, followed by adopting the principle of information confidence factors. In turn, this will enable decision-makers to more expeditiously make critical logistics decisions. Moreover, to embrace a knowledge-centric approach, the DPO should institutionalize disciplined information management principles as previously discussed. Otherwise, future DPO SA solutions may be relegated to providing the latest ways to present “uncertain” information. Or users will continue to be burdened with checking, double-checking, and calling someone to ensure information confidence prior to making a decision. To solidify this recommendation, the DPO should adopt process, information, and business rule ownership, to include identification of ownership stewards, and measuring information and knowledge management performance.

Address Critical Path Concerns for DPO SA in Appropriate Governance Forums

As outlined earlier, there are several elements to consider with regard to achieving the objective of information confidence. They range from personnel training, disciplined information reporting, and access to appropriate technology, to ownership of processes, information, and business rules, to name but a few. USTRANSCOM should continue to leverage the DPO and Department level governance forums to better ensure information confidence within the DPO SA environment. Some elements are directly within USTRANSCOM's control like senior-leader buy-in and many are influenced at the DOD level.

Conclusion

In closing, this paper posed three questions to help frame the discussion. First, what should be the end-game objective for DPO SA? The answer proposed was the basis for the paper's thesis, that the DPO should articulate the need for information confidence as its fundamental requirement for an effective and successful SA environment.

Secondly, what is in the critical path to achieve the DPO SA objective? The paper provided an overarching look at several elements within the critical path for success (some within USTRANSCOM's direct control and some requiring coordination at the DOD level of responsibility). Finally, it asked "How does the DPO get to the objective end-state?" The recommendations cited above should provide a sound start to USTRANSCOM's pursuit of a future DPO SA environment. The author's intent was to address the DPO's considerations in a holistic manner, spanning across multiple areas that will undoubtedly influence USTRANSCOM's ability to transform to the DPO of the future.

There is no single silver bullet for success here. However, as USTRANSCOM moves forward with DPO transformation through implementation of the AT21 initiative and delivery of IT-enabled capabilities through its Corporate Services Vision, it should consider and take advantage of the aforementioned research, best practices, and industry standards. This will help guide its end-game for a future DPO SA environment, informed by an appropriate cost-benefit analysis to determine the value of such an undertaking.

Abbreviations

AMC	(Air Mobility Command)
AT21	(Agile Transportation for the 21 st Century)
COP	(Common Operating Picture)
D2	(Deployment and Distribution)
DISA	(Defense Information Systems Agency)
DLA	(Defense Logistics Agency)
DOD	(Department of Defense)
DPfM	(Distribution Portfolio Manager)
DPO	(Distribution Process Owner)
GATES	(Global Air Transportation Execution System)
GCSS-J	(Global Combat Support System – Joint)
IED	(Improvised Explosive Device)
IT	(Information Technology)
OSD	(Office of the Secretary of Defense)
RFID	(Radio-Frequency Identification)
SA	(Situation Awareness)
SDDC	(Surface Deployment and Distribution Command)
TACC	(Tanker Airlift Control Center)
USTRANSCOM	(United States Transportation Command)

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