Automatic Efficency for Technical Spare Parts: Deprecated Inventory Scoring System

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Abstract- This paper outlines the design and methodology of the Deprecated Inventory Scoring System (DISS), a framework aimed at optimizing the management of deprecated technical spare parts. DISS integrates the Item Sensitivity & Confidentiality Score (ISCS) and the Deprecated Inventory Form (DIF) to provide a comprehensive evaluation of each part's status. By leveraging a dynamic scoring system, DISS enables logistics specialists to make informed decisions quickly, ensuring efficient and effective inventory management. Implementing DISS is expected to streamline inventory processes, reduce unnecessary shipments, and enhance overall system efficiency. This, in turn, supports the operational readiness and reliability of security technology.

INTRODUCTION

The Deprecated Inventory Scoring System (DISS) is a framework for managing deprecated technical spare parts, inspired by the Common Vulnerability Scoring System (CVSS) in cybersecurity. It scores spare parts based on various factors, helping logistics specialists prioritize actions and manage inventory efficiently. DISS aims to streamline the inventory management of Technical Security Systems (TSS) spare parts by automating evaluations, reducing response times, optimizing availability, and minimizing unnecessary shipments. It ensures sensitive and critical parts are always available.

DISS is comprised of three extensions to the Computerized Maintenance Management System (CMMS). The first extension is the Item Sensitivity & Confidentiality Score (ISCS), which requires the domestic field office to assign a score and provide additional information for each part entry in the CMMS. This information includes any limitations the part has when being deprecated or transported. The second extension is the Deprecated Inventory Form (DIF), designed to be an easy-to-use form for field offices to quickly evaluate a deprecated part. It standardizes the reporting process, ensuring efficient decision-making. Finally, the DISS Algorithm itself is an automated system that analyzes the data from the ISCS and DIF to provide actionable recommendations, enhancing inventory management efficiency.

ITEM SENSITIVITY & CONFIDENTIALITY SCORE (ISCS)

The Item Sensitivity & Confidentiality Score (ISCS) is a key part of the Deprecated Inventory Scoring System (DISS), designed to improve the management of technical spare parts. Its value is assigned by the domestic field office officals with advanced knowledge of the legal and techical requirements of each technical spare part.

It provides a clear format for assessing the sensitivity and confidentiality of each item, ensuring proper handling throughout their lifecycle. This is crucial for the security and operational readiness of U.S.

diplomatic facilities. The ISCS systematically evaluates the sensitivity and confidentiality of item within CMMS as they are entered into the system, ensuring compliance with legal and practical requirements. This reduces the risk of mishandling sensitive parts and enhances the effectiveness and resilience of diplomatic operations.

The ISCS assigns a score between 0.0 and 10.0 to each item, based on the following factors:

- Legal Requirements: Compliance with laws and regulations.
- Economic Implications: Costs of handling, storing, and disposing.
- Practical Handling Considerations: Feasibility of handling procedures.

The ISCS is integrated into the Computerized Maintenance Management System (CMMS), allowing logistics specialists to make quick, informed decisions.

Sensitivty Tiers and Handling Requirements:

Score	Description	Example
0.0-2.0: No Requirements	Items in this range can be disposed of or recycled without special instructions.	WIRE500 – ISCS: 0.1, No Requirements
2.1 - 4.0: Basic Handling	Minimal handling is required, following standard disposal or recycling protocols.	CABL200 – ISCS: 3.5, Basic Handling
4.1 - 6.0: Moderate Sensitivity	Specific handling is needed, such as wiping data or securely packaging parts.	MODU300 – ISCS: 5.0, Ensure Data Wiped
6.1 - 8.0: High Sensitivity	Careful handling is required, including removing sensitive components like hard drives before disposal.	SENS400 – ISCS: 7.5, Remove Hard Drive
8.1 - 10.0: Ship Back Domestically	Highly sensitive items must be shipped to a domestic facility for secure processing.	ALRM1294 – ISCS: 9.5, Ship Back Domestically

To further guide the handling process, additional tags may be included with the ISCS. These tags provide specific instructions for handling certain items, ensuring that all necessary precautions are taken such as:

- Remove Hard Drive: Indicates that the hard drive must be removed before disposal.
- Special Instructions: Provides any special handling instructions that must be followed.
- Secure Packaging Required: Specifies that the item must be securely packaged to prevent damage or tampering.

The ISCS score is displayed in the repairable note section of a CMMS item, making sensitivity and confidentiality requirements visible to all relevant personnel. This ensures proper handling and compliance with protocols.

The ISCS is essential for automating and streamlining inventory management, supporting the safety and security of diplomatic facilities, and enhancing operational readiness. It helps maintain a balanced inventory, reduce operational costs, and improve response times, ensuring that security technology is always up-to-date and operational. The ISCS ensures sensitive parts are handled in compliance with legal and practical requirements, safeguarding U.S. diplomatic operations globally.

DEPRECATED INVENTORY FORM (DIF)

The Deprecated Inventory Form (DIF) helps field logisticians report deprecated technical spare parts accurately, ensuring efficient decision-making and streamlined inventory management. It standardizes the reporting process, maintaining the operational readiness and security of U.S. diplomatic facilities by handling parts according to their sensitivity and confidentiality levels.

Each form field requires a value between 0.0 and 10.0, reflecting metrics that impact spare parts handling and disposition. These metrics include current stock levels, manufacturer production status, warranty status, condition of parts, supply constraints, usage reports, space constraints, and economic considerations. Clear criteria for each metric enable quick, informed assessments, optimizing inventory management.

Current Stock Levels (CSL): Metric The CSL metric describes the ratio of the previous year's total used stock to current stock levels. Logisticians need to review inventory records in the CMMS to determine this ratio.

Value	Description	Score
Very High Stock	Stock levels are very high compared to usage	0.0
Moderate Stock	Stock levels are moderate compared to usage	4.0

Very Low Stock	Stock levels are very low compared to usage	8.0
Out of Stock	No stock available	10.0

Manufacturer Production Status (MPS): Metric The MPS metric describes the production status of the spare part. Logisticians need to check the manufacturer's current production status for the part.

Value	**Description**	**Score**
In Production	Currently being produced	0.0
Limited Production	Limited production runs	5.0
Discontinued	No longer produced	10.0

Warranty Status (WS) Metric: The WS metric describes the warranty status of the spare part. Logisticians need to check the purchase date against the warranty information in the CMMS item database entry. This metric is unique as is only requires a True (10.0) or False (0.0) value.

Value	**Description**	**Score**
Out of Warranty	Warranty expired	0.0
Under Warranty	Still under warranty	10.0

Condition of Parts (CP) Metric: The CP metric describes the physical state of the spare part. Logisticians need to visually inspect the part and assess its condition based on the criteria provided.

Value	Description	Score
Completely Ruined	Unsalvageable	0.0
Severely Damaged	Major damage	2.0
Compromised	Significant issues	4.0
Degraded	Noticeable wear and tear	6.0
Slightly Off	Minor issues	8.0
Excellent	No issues	10.0

Supply Constraints (SC) Metric: The SC metric describes the scarcity of the item. Logisticians need to assess the availability of the part from suppliers and the lead time required to obtain it.

Value	Description	Score
Readily Available	Easily obtainable	0.0
Limited Production	Somewhat difficult to obtain	5.0
Limited Availability	Difficult to obtain	10.0

Usage Reports (UR) Metric: The UR metric describes the frequency and intensity of use of the spare part. Logisticians need to review usage reports to determine how often and intensely the part is used.

Value	Description	Score
Rarely Used	Low frequency/intensity	0.0
Occasionally Used	Medium-low frequency/intensity	2.0
Regularly Used	Medium frequency/intensity	4.0
Frequently Used	Medium-high frequency/intensity	6.0
Constantly Used	High frequency/intensity	8.0
Always Used	Very high frequency/intensity	10.0

Space Constraints (SP) Metric: The SC metric describes the size and weight of the part. Logisticians need to measure the part to determine shipping considerations.

Value	Description	Score
Large & Heavy	Difficult to ship	0.0
Medium Size/Weight	Moderate shipping considerations	5.0
Small & Light	Easy to ship	10.0

Economic Considerations (EC) Metric: The EC metric describes the price of the item. Logisticians need to assess the financial impact of the part based on its purchasing price.

Value	Description	Score
Low Cost	Inexpensive	0.0
Medium Cost	Moderately priced	5.0
High Cost	Expensive	10.0

In summary, the Deprecated Inventory Form (DIF) standardizes the reporting of deprecated technical spare parts, ensuring efficient inventory management and operational readiness. By using clear metrics and scoring, it helps logisticians make informed decisions, optimizing the handling and availability of critical parts.

DISS ALGORITHM

The DISS Algorithm enhances decision-making for managing deprecated technical spare parts by integrating the Item Sensitivity & Confidentiality Score (ISCS) and metrics from the Deprecated Inventory Form (DIF). It evaluates each part's status to determine appropriate actions, ensuring efficient handling and maintaining the operational readiness and security of U.S. diplomatic facilities.

The algorithm uses a neural network with input nodes corresponding to DIF fields and an output node indicating whether to return the part (0) or discard it (1). The DISS score, ranging from 0.0 to 10.0, guides these decisions, with higher scores favoring retention.

Pseudo code:

```
DISS_score = 0

If ISCS >= 8:
       DISS_score += 10

If warranty is active:
       DISS_score += 5

DISS_score += (Condition * 0.2)
DISS_score += (Manufacturer Production Status * 0.2)
DISS_score += (Current Stock Levels * 0.1)
DISS_score += (Supply Constraints * 0.1)
DISS_score += (Usage Reports * 0.1)
DISS_score += (Space Constraints * 0.1)
DISS_score += (Economic Considerations * 0.1)
```

```
DISS_score = min(DISS_score, 10.0)
print(DISS_score)
```

The algorithm, refined through machine learning, adapts to new data, improving its recommendations over time. This systematic approach optimizes operational efficiency and security, reducing the risk of mishandling sensitive components and enhancing the resilience of diplomatic operations globally.

CONCLUSION

The Deprecated Inventory Scoring System (DISS) significantly advances the management of technical spare parts by integrating the Item Sensitivity & Confidentiality Score (ISCS) and the Deprecated Inventory Form (DIF). This comprehensive and automated approach generates clear, actionable recommendations, ensuring parts are handled based on their sensitivity, condition, and logistical needs.

Implementing DISS optimizes spare parts availability, reduces unnecessary shipments, and enhances inventory management efficiency. This system supports the operational readiness and reliability of security technology, improving the resilience and effectiveness of global operations. By leveraging DISS, organizations can efficiently manage sensitive parts, reducing risks and enhancing their security and operational capabilities worldwide.