National Aeronautics and Space Administration

IT Labs Prototype Project: NASA Langley RFID Equipment Inventory Project

Office of the CTO for IT

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NASA IT Vision: The NASA IT Organization is the **very best** in government

Fabiola C. Martin/Langley Research Center

<Date>

Overview

Problem definition

- There is a need to reduce the amount of time and effort involved in conducting equipment inventories.

Background

- Current technology dictates that Inventory Personnel at LaRC must visually sight over 25,000 equipment items using bar code scanners. This current process takes from six months up to one year to complete. The problem with this procedure is that by the time the inventory is completed, many items are relocated on the Center (due to actions such as reorganizations, job changes, and attrition) and this invalidates the information in the database and contributes to the potential for increased equipment losses.

Expected Project Outcome:

- It was anticipated that with RFID IT technology, inventories would be conducted in less time with fewer people

Alignment with 2011 NASA IRM Strategic Goals and Objectives

- **Strategic Goal 1: Objective 1.0** –Transform NASA's IT infrastructure and application services to better meet evolving stakeholder needs and support mission success. Provide enterprise applications that support the Agency's business and information needs, with new initiatives and enhancements focused on improving business & management practices.
- This RFID It Technology Project supports the business and information needs of the NASA Equipment Management organizations by improving the time in which inventories are conducted and providing efficient access to RFID inventory status information.

Approach

- This Project was conducted in two phases. The Phase I was sponsored by the LaRC Logistics Organization for the AssetTrak database software, scanners, and peripheral equipment needed to start the Process. Phase II was sponsored by the IT Labs for Webtrak software and tags, and to develop status reports which are accessible online.
- To achieve this project's outcomes, the Logistics Team selected Building 1268 to be inventoried as a prototype. This building has the largest number of equipment items (6,052 items) at LaRC.

Approach

- This is also a collaborative funding effort between the LaRC Logistics Management Branch and the NASA HQ IT Labs Project.
- The Logistics Branch funded the initial phase to provide computer software, scanners, training and RFID tags. The IT Labs funded the second phase for online access, customized reports and additional RFID tags.
- To date, the Logistics Team has been able to assign RFID tags to 2,633 items and add them to the 1,000 items that were previously tagged by the Climate Science Branch. Therefore 3,633 or 60% of the items in Building 1268 now have RFID tags. We conducted a dual enrollment.
- Progress on the RFID has been slightly hindered because stronger emphasis has been focused on accomplishing the FY13 Annual Equipment Inventory, which began on October 1, 2012.

Issues/Challenges

- **Involving Inventory Clerks and Equipment Manager early**
- Having someone with IT computer programming capability **and knowledge of equipment** at the beginning
- Pre-planning for server availability
- Understanding the contractor' nomenclature to map to our report requirements
- Obtaining approval for radio-frequency noninterference for the scanners
- Estimating the time to complete the process
- Allowing for partial payments for materials delivered while software modifications are being resolved
- Ensuring completion of work prior to receipt of invoices
- Ensuring orders are placed for FOB Other, not FOB destination to allow for shipping costs

Lessons Learned

- **There is no direct connection to SAP/Scanners can't "see" through metal**
- Obtain an electronic copy of the records in your NASA equipment database from Mary Mershon at the NASA Enterprise Application Competency Center (NEACC) 256-962-9789 mary.a.mershon@nasa.gov to provide to the Contractor
- Make sure RFID tag numbers do not duplicate numbers at other Centers
- If possible preload the software onto your server remotely before the Contractor comes to your Center to provide training
- Make sure scanners are pre-charged before the Contractor comes to your Center
- Purchase one extra scanner than the number of people on your inventory team in case of repairs
- Establish teams of 3 so that the RFID tagging process will be quicker
- If you want management to monitor the RFID progress, purchase WebTrack
- You may need to purchase a site license for AssetTrak to be installed on the computers of multiple members of your inventory team

Findings/Observations (if applicable)

- RFID inventories can be conducted in less than half of the time it takes to conduct an inventory with ECN tags.
- The WebTrak software provides visibility into the progress of the completion of the RFID inventory project.
- The deliverable reports provided additional functionality that is not available in SAP. (For example information related to RFID tags and the status of the RFID inventory are now accessible online for management oversight and can be exported to Excel for detailed review.)
- Potential cost savings are not readily apparent due to initial outlay of funds required to purchase RFID software, scanners, training, tags, and online software. However, in the long term the program will pay for itself in man-year efficiencies, less employee work interruptions, less time searching for and reconciling lost equipment, and fewer lost items.

Required Project Deliverables

Required Deliverable	Deliverable Description	Was it produced and submitted?	If no, why not?
AssetTrak, WebTrak, and Handheld Software	Computer, online and scanner software	Yes	
RFID Equipment Tags	Combined total of 13,579 RFID equipment tags and 1,000 room tags.	Yes	
Scanners and peripherals	3 Motorola Scanners and peripherals	Yes	
Training and professional services	RFID enrollment and software training and report modifications	Yes	

Funding Strategy

PHASE I LINE ITEMS PURCHASED by LaRC	COST
AssetTrak - RFID Database Software	$ 7,150.00
Three (3) RFID Scanners, cables, batteries, cradle kit, 3-yr Motorola scanner service	$ 7,895.67
5,000 RFID Equipment Tags	$10,400.00
1,000 RFID Door Labels	$ 750.00
Scanner Software	$ 715.00
Server Software	$ 2,860.00
Database Conversion, Enrollment Training, Script for Handhelds, Integrating Reports to SAP, On-Site Software Installation and Training	$37,440.00
Travel	$ 4,680.32
Shipping	$ 307.24
TOTAL	**$75,307.24**

Funding Strategy

PHASE II LINE ITEMS PURCHASED By IT Labs	COST
WebTrak – RFID Online Software with Customizable Reports and Training	$12,155.00
8,579 RFID tags	$17,844.32
Shipping (Paid by LaRC - $304.63)	<---
TOTAL	**$29,999.32**

POSSIBLE ADDITIONAL PURCHASES at LaRC	AMOUNT
One-Time Expenses at LaRC	
Customization to scanner software for WI-FI Real-time transfer of data from scanner to computer (one-time expense)	$21,428
Remaining 15,000 tags (one-time expense)	$31,200
Remaining 3,414 RFID room tags (one-time expense)	$ 2,562
One-Time Expense Total	**$33,762**
Recurring Expenses at LaRC	
Enasys Annual Software Maintenance (recurring expense)	$ 2,000
1,000 RFID tags for new incoming items (recurring expense)	$ 2,000
Software Maintenance on LaRC server (recurring expense)	$ 6,800
Recurring Expense Total	**$10,800**

Cost Savings

- As mentioned previously, we have only partially completed RFID tagging in one building. However if the results from this building are an indicator, we should be able to save at least one man-year of effort, which will be repeated cumulatively every year from this point. This could lend itself to the possibility of either having more frequent inventories or the ability to utilize inventory personnel in other capacities.

Recommendations

- Based on the results of this prototype project the RFID Equipment Inventory Team recommends that LaRC proceed with the project to its completion. It is also recommended that other NASA Centers pursue efficiencies in their inventories using RFID IT Technology.

RFID Pre-Inventory Process

Downloads BW Data to Computer

Sync BW Database to AssetTrak Database

Load AssetTrak Database to Scanner

Inventory Specialist Determines Items to Tag

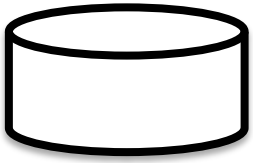
Scans ECN then RFID to "Enroll"

Attaches RFID Tag to Equipment

Loads Enrolled Data on AssetTrak Database

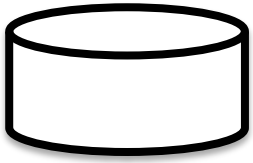
RFID Inventory Process

Load AssetTrack Database to Scanner



Scan RFID Tagged Items

Load Scanner Data to AssetTrack



AssetTrak Converts Scanner Data to Text File for the Computer

Text File Sent From Computer to SAP

SAP Updates the Inventory Data in BW

Download BW Updates to Computer and Sync to AssetTrak

Licensing Model

- AssetTrak and scanner software are purchased on a per user basis
- WebTrak software allows multiple users to query reports online
- Other Centers might want to pursue an agreement for a site license with multiple users for AssetTrak

Method for Estimating Cost Savings

- Cost of an inventory specialist, **plus**
- 15 minutes for half of the people who spend time searching for one piece of misplaced equipment, **plus**
- Time saved by cutting the inventory time in half, **plus**
- Money saved by fewer lost pieces of equipment, **plus**
- Time spent completing survey reports, **plus**
- Time saved by shorter employee interruptions ---

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Basis for Estimating Costs

RFID BASIS For Estimating Cost Savings/Cost Avoidance

Assumptions Used to Create an Estimate	Estimates
Total value of 41 items lost in 1 year	$172,000
Total number of Custodians	393
Estimated average grade of Custodians	GS-9 step 5
Time custodians spend searching for 1 misplaced item	15 minutes
Estimated annual salary of Inventory Specialist	$50,000
Number of people on Survey Board	5
Estimated average grade Survey Board Members	GS-11 step 5
Time spent by Survey Board Members each month	1 hour
Number of employees interrupted @ 15 minutes to conduct the inventory	1875
Estimated average grade of employees	GS-11 step 5

Estimated Potential Annual Savings/Cost Avoidance	Before RFID	After RFID (Estimated)	
		Cost Savings	Cost Avoidance
Cut the value of items lost in half	$172,000	$85,800	
Reduce 3 Inventory Clerks to 2 Inventory Clerks annual salary (burdened)	$150,000	$50,000	
Half of the Custodians (197) @ $21.13/hr. for 15 minutes searching for misplaced items	$2,000		$1,000
Half of the time for 5 Property Survey Board members @ $31.28/hr. for 1/2 hr./mo. for 12 mos.	$1,900		$900
Half of the time for 1,875 employees @ $31.28/hr. being interrupted for 7 mins. to conduct the inventory	$14,700		$7,300
	$340,600	$135,800	$9,200

Project Team

- Project Manager: Fabiola C. Martin, Logistics/LaRC

- Project Team (Civil Servant and Contractors):
  - » Connie Buffin, Logistics Management Branch/LaRC
  - » Steven Mercier, Science Systems and Applications, Inc./LaRC
  - » Justin Moore, Alutiiq, LLC/LaRC
  - » *Amy Tardy, Alutiiq, LLC/LaRC*

- Project Sponsors:
  - » Frank Johnson, Logistics Management Branch/LaRC
  - » Edward L. McLarney, Office of Chief Information/LaRC

Backup

Answers to Questions

- What is the range of an RFID tag?
  - » NASA Langley uses Omni-ID Prox passive RFID tags and they look like the blue and white tag in the picture below. Their read range is up to 3 feet.

Answers to Question (Continued)

- What are the sizes of RFID tags?
  - » At Langley, the metal-mount tags that we use on our equipment are 1-1/4 inches wide, and 6/8 inch tall, and about 3/8 inch thick. The paper tags that we use on the rooms are 4 inches wide, 2 inches tall and they are paper thin (they look like a sticky-back mailing label).
  - » The sizes of the RFID tags vary depending upon the type of tag you select. RFID tags can be very small - the size of a large rice grain. Others may be the size of a small paperback book. On the next page there is a picture of a variety of RFID tags


RFID Folding Tab Tag
Contact Engineering
For Maintenance
E50001
DIETZ
DIETZ
CORPORATION
Contact Engineering
Maintenance
0202200600000000100094
00000306

Answers to Questions (Continued)

- What types of items do you tag at Langley?
- We tag office equipment, computer equipment, computer peripherals, vehicles, research equipment, lab equipment, emergency equipment, special purpose equipment, equipment that are considered to be highly desirable for personal use, and a host of unique exhibit items.
- At what dollar value do you tag furniture?
  - » I spoke to our Equipment Manager and found that we rarely tag furniture. We only have one tagged piece of furniture. Our required tagging value is anything that costs over $5,000.