

Security Assets & Information Management System

by

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Abstract

Classified information is crucial to protecting our national security. Not enough is being done to protect this information as security specialists in the Intelligence Community, Department of Defense and Industry/Contractors everywhere are struggling to keep track of what they have. Security Assets & Information Management System intends to help security specialists improve their security programs by helping manage this classified information. Security Assets & Information Management System has an interface and database to keep track and manage all classified assets and material. Security Specialists and Auditors can use this system to determine where assets and documents are, along with their status. This system fills a gap and creates a solution that did not exist in the first place. Security Specialists can now quickly and easily manage everything in one system. This will not only help their security program, but national security as well.

Introduction

Project Summary:

Our team developed a management system that will allow government entities or defense contractors to manage their classified assets & materials, using an unclassified system and network. This system will help the security office keep track and manage all their assets & materials they are responsible for. Currently no specific system exists in its place to allow government entities or defense contractors to manage their physical assets & documents.

Problem Statement:

There is not an efficient way for security professionals to manage their physical assets & materials. Many government entities and defense contractors often do not know how many of their assets & materials they have or where exactly they are located at. They are mandated and required to know this information, but often cannot be due to the lack of a management system in place. Within the National Industrial Security Program Operating Manual (NISPOM) under Chapter 5 and Section 2, it is stated: “Contractors shall establish an information management system to protect and control the classified information in their possession” (Department of Defense, 2016).

This problem effects the United States’ National Security as if classified information becomes lost or leaked, it will cause damages that cannot be put in a number value. More specifically, the entities involved are federal government entities and defense contracting companies who are responsible for managing this information. As George Tenet, former Director of Central Intelligence, said in 1999: “It is impossible to measure the total damage done to US intelligence through these leaks, but knowledgeable specialists assess the cumulative impact as truly significant”.

The outcome of the problem if not solved would be the loss of intelligence information and damage to national security. One specific example is, “The Washington Times revelation in 1998 that the U.S. could monitor Usama Bin Laden’s location via his satellite telephone compromised that source of intelligence with the consequence that Bin Laden continued to operate his Al-Qaida network for many years” (Snyder, 2015). In addition, various examples would be “disclosures have resulted in significant damage to diplomatic relationships with countries that share intelligence with the U.S., damage to domestic commercial relationships between the U.S. public and private sectors leading to less information sharing and innovation, and damage to the public confidence in the NSA leading to fewer resources and authority to protect the U.S. in the manner that it has done so since 9/11” (Young, 2014).

The problem is taking place at government facilities and defense contractor facilities across the United States. These facilities are responsible for managing the classified assets & documents at their location.

This problem needs to be fixed to prevent the loss of classified information and more damage to national security.

Solution:

This management system has been developed to fill a gap in a system/software that does not currently exist. It provides a central system for security professionals to manage their physical assets & materials. It provides important information about the physical assets & materials such as where it is located. It also shows if the asset or document has been transferred to another location or has been destroyed/decommissioned. Additional information includes various information about the physical assets & materials, such as the owner and the classification level. Special features will include auditing and warning features to enforce policies in place. This will help assist to immediately identify if something has become lost or missing.

Project Source:

The inspiration behind this project is based on firsthand experience and knowledge working with security professional who work for and with national security. Many security professionals expressed the desire to have a better way to manage their assets & documents. Trent Nguyen was able to see this firsthand with some government entities and industry. Researching into the issue further, there was an instance where documents that went missing from NASIC at WPAFB that went unnoticed. According to the Department of Justice, “Law enforcement discovered the documents which contained approximately 2,500 pages of material classified at the Secret level, while executing a search warrant at Kemp’s home on May 25, 2019” (DoJ Office of Public Affairs, 2021). From there he came up with an idea that would help security professionals everywhere help manage their assets & materials. This process would help ensure that missing documents are noticed more quickly and less documents would go missing. The project team was formed with several ideas, and this becoming the most lucrative option when developing ideas.

Discussion

Project Objectives/Goals:

1. Functional Objectives/Goals:
 - a. Develop Inventory Management System
 - b. Develop Multiple Databases/Tables
 - i. Personnel Database
 - ii. Asset Database
 - iii. Location Database
 - c. Provide important information needed by security professionals
 - d. Ability to change or update information of physical assets & documents
 - e. Ability to change the status/state of physical assets & documents
 - f. Built in auditing features to ensure physical assets & documents are accounted and in control
 - g. Easy auditing tasks and management of physical assets & documents through barcode management
 - h. Ability to Operate Securely
2. Personal Development Project Objectives/Goals:
 - a. Have fun
 - b. Learn about technologies that we haven't used before
 - c. To solve a problem that we think needs to be solved
 - d. Have clear documentation

Project Scope:

Our team will develop a functional application that enables users to solve a management problem by utilizing the following features and functionality:

- Central system for security professionals to manage their physical assets & materials
- Central database for personnel, assets and locations
- Auditing features to ensure accountability and control, such as labels and barcodes
- Security warning features such as login notice and consent and system banners
- User security features such as two-factor authentication and user account monitoring
- Digital Signature Blocks for the verification of destruction of assets

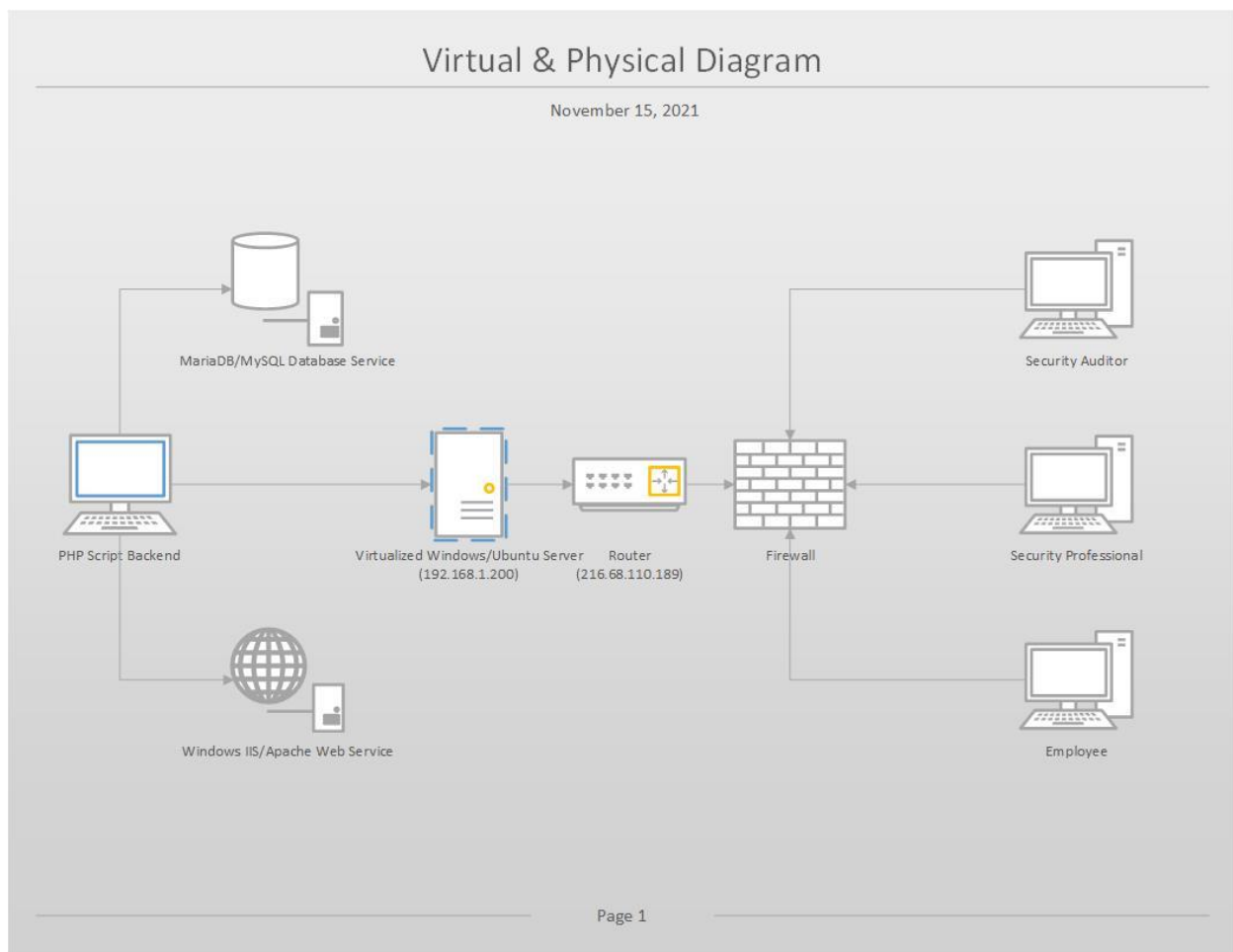
Quick Project Timeline:

Task #	Task Name	Duration	Start Date	End Date
1	Team Contract	3 weeks	8/23	9/12
2	Proof of Concept	3 weeks	9/13	10/3
3	User Research / Use Cases	1 weeks	10/4	10/10
4	Development	1-2 Months	10/11	11/15
5	Documentation/ Presentation Preparations	1 week	11/15	11/21
6	Report & Presentation	1 week	11/22	11/28
7	Development	1-2 Months	1/10	2/27
8	QA/User Testing and Refinement	1 Week	2/28	3/6
9	Feature Refinement	1 week	03/7	03/20
10	Documentation / Presentation Preparations	1 week	3/21	3/27
11	Final Report & Presentation	3 weeks	3/28	4/17

Technologies Used:

- We used Linux/Windows to host everything.
- We used Apache/IIS for our Web Server Software.
- We used MySQL/MariaDB to develop and maintain the database.
- We used PHP, JavaScript and CSS for the web development code.
- We used our local hardware to power everything.
- We used Linear Barcodes (Code-128) for the scanners.
- We used Google Authenticator for the Two-Factor authentication.

Technical Architecture Diagram:



User Personas:

Table 1 User Persona Table

User Persona: The Security Professional	
	Program Security Officer/Facility Security Officer
	John Smith
	40
	Male
Behavior	Responsible for the security of respective program/facility. Manages various personnel, assets & materials within their program/facility. Responsible for the creation, transmittal/receival and destruction of the document.
Pain	Keeping track of where everything is located and what classified material exists.
Needs & Goals	A system to keep track of the assets and documents within their respective program/facility.

Table 2 User Persona Table

User Persona: The Auditor	
	Cognizant Security Agency Representative
	Mike Man
	50
	Male
Behavior	Responsible for accrediting and inspecting the program/facility. Responsible for ensuring the security professional is doing his job.
Pain	Proving the Security Professional is following the rules and regulations.
Needs & Goals	A system that can allow the verification of documents and assets.

Table 3 User Persona Table

User Persona: The Engineer Personnel	
	Senior Engineer
	Jane Jones
	50
	Female
Behavior	Responsible for research & development of the latest directed energy weapons for the government. Constantly reading research papers and sharing test information.
Pain	Being able to find her document and where it it's located.
Needs & Goals	A system to identify the location of a document.

Table 4 User Persona Table

User Persona: The Intelligence Officer Personnel	
	Junior Intelligence Analyst
	Adam Bush
	25
	Male
Behavior	Responsible for analyzing intelligence. Responsible for developing new intelligence reports. Responsible for sharing intelligence reports.
Pain	Sharing intelligence reports with other personnel.
Needs & Goals	A system to identify the location of intelligence reports at other location.

Use Cases:

Table 5 Use Case Table

Use Case ID	UseCase_001
Use Case Name	Lookup Asset/Document Information
End Objective	Information about the Asset/Document is provided to the user looking up the information. Will provide all information necessary and required.
User/Actor	All
Trigger	The user scans or searches various fields for the document
Frequency of Use	75% of actions will be looking up information
Preconditions	User must know some information of the asset/document before looking it up.

Table 6 Use Case Table

Use Case ID	UseCase_002
Use Case Name	Verify Asset/Document Information
End Objective	The location and information of asset/document is physically checked & verified.
User/Actor	Security Professional/Auditor
Trigger	The user has a list of documents he/she must scan the barcode to verify.
Frequency of Use	5% of actions will be verifying based on security schedules/policy
Preconditions	User must have the document physically there.

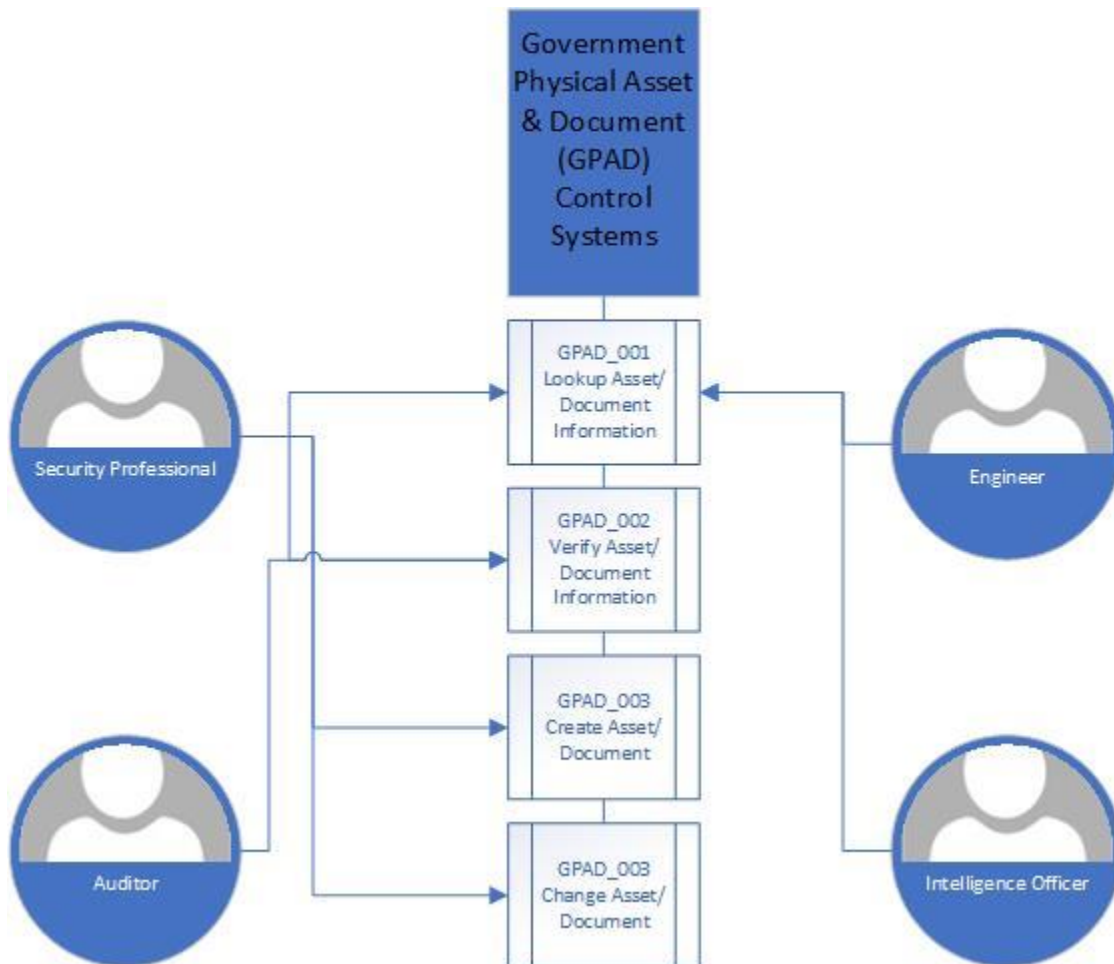
Table 7 Use Case Table

Use Case ID	UseCase_003
Use Case Name	Asset/Document Creation
End Objective	Add a new assets/document to the database with the correct information.
User/Actor	Security Professional
Trigger	This creates a new barcode/control number for the asset/document and add entry into the database
Frequency of Use	10% of actions will be creating a new asset/document to the database.
Preconditions	User must have the document physically there and all it's information.

Table 8 Use Case Table

Use Case ID	UseCase_004
Use Case Name	Change Asset/Document Status
End Objective	Update the current status of the asset/document
User/Actor	Security Professional
Trigger	The updates the information of the asset/document.
Frequency of Use	10% of actions will be changing the status of the asset/document.
Preconditions	User must know some information of the asset/document before changing the status

Use Case Diagram:



Testing Plan:

Overview

Our testing plan for Security Assets & Information Management System was an extensive plan and process. We will test all major implemented features and features that may have changed/broken anything. We have broken it down to several sections/phases and describe how it was completed.

Methodology

Testing will be conducted by industry best standards and practices. Testing will include breakdowns as to what went wrong and what was successful in detail.

Scope

- Feature: Asset and Information tracking was a feature requested by the security team. This will allow for easier tracking for classified assets.
- Feature: Auditing system was a feature requested by the security team. Makes sure proper procedures are followed to prevent data leakage and ensure the items haven't been moved or removed.
- Feature: Search function was a feature requested by the security team. Allows for quick and refined searches for various assets and information.

Objectives

Testing Objectives & Strategies will follow IEEE 829 standards:

- Analyze the product
- Design test strategy
- Define test objectives
- Define test criteria
- Resource planning
- Plan test environment
- Schedule and estimation
- Determine test deliverables

Additionally:

- Major Implemented Features Tested
- All Major/Visible Bugs Resolved before IT Expo

Test Logs and Procedures

Test Case ID	TestCase_001
Test Case Name	Two Factor Authentication
User	Alec Siegel
Role	User Testing
Expected Output	The login will be successful upon entering the two-factor code.
Actual Output	The login was successful upon entering the two-factor code from the google authenticator application.
Pass/Fail	Pass
Reason for Success/Failure	The user was able to complete a successful login using their credentials as well as completing the second layer of authentication.
Date	3/27/22

Test Case ID	TestCase_002
Test Case Name	Asset Tracking, Searching and Auditing.
User	Robert Hart
Role	User Testing
Expected Output	Assets are able to be created and tracked. Assets are able to be searched and found. Assets are able to be audited.
Actual Output	Assets were able to be created and tracked. Assets were able to be searched and found. Assets were able to be audited.
Pass/Fail	Pass
Reason for Success/Failure	The asset dashboard and created page are implemented/working correctly and have been debugged. The auditing feature is implemented/working correctly and have been debugged.
Date	3/27/22

Test Case ID	TestCase_003
Test Case Name	Signature Field and Other Fields Testing
User	Michael Williams
Role	User Testing
Expected Output	Signature Field and Other Fields created will save properly and not cause any errors/issues.
Actual Output	Signature Field and Other Fields created have saved properly and not cause any errors/issues.

Pass/Fail	Pass
Reason for Success/Failure	No errors or crashes caused when attempting to save a newly created asset. Functioning as expected.
Date	3/27/22

Test Case ID	TestCase_004
Test Case Name	Display Test
User	Daniel Cullen
Role	User Testing
Expected Output	The website will display properly on Microsoft Edge, Google Chrome, & Mozilla Firefox. Everything will be formatted as expected.
Actual Output	The website displayed properly on Microsoft Edge, Google Chrome, & Mozilla Firefox. Everything was formatted as expected.
Pass/Fail	Pass
Reason for Success/Failure	The website displayed properly on all three web browsers and everything appears as expected.
Date	3/27/2022

Test Case ID	TestCase_005
Test Case Name	Backend Testing
User	Trent Nguyen
Role	Maintenance Testing
Expected Output	System Administration roles will be properly setup and will be functioning as expected.
Actual Output	System Administration roles are properly setup and are functioning as expected.
Pass/Fail	Pass
Reason for Success/Failure	The Windows Server 2022 is hosting a Hyper-V instance of the live production Ubuntu Server, is functioning and running normally. The Ubiquiti Dream Router configurations are properly setup/configured for connecting the live production server to the public internet.
Date	3/27/2022

Testing Review

During the testing phases we had encountered some minor errors/issues. With the help of the built-in debugger, we were able to promptly resolve the issue and continue forward. We were able to run the test cases multiple times over, until we received a pass. In the future, we would plan to continue the same practices and procedures.

Change Management Plan:

Anyone within the development team can request a change. The change will be prioritized based on the effect it has on the software application running. With this software application, the downtime of the application should be minimal. If it is a bug/error that does not stop the user from completing the task at hand or is a necessary feature, it will be less prioritized compared to something that crashes the software application in a unique instance or causes minor data not to be saved. Bugs/errors that causes the whole software application to crash and stops the user from completing the task at hand will be prioritized, resolved, and changed as soon as possible. This process may lead to minor bugs/errors to be unnoticed or forgotten about. The approval process will be a simple process, where if there are no other bugs/errors caused by the change, it will be automatically approved. If there are other bugs/errors cause by the change, the approval be discussed with the team and determined by the majority to implement the change or not. Stakeholders will be notified what the bug/error is, what the priority of the bug is, the planned resolution and an estimated timeline on the bug/error.

Budget:

Included in the budget are the labor costs for Team 30 and the costs for any software/hardware used in the project. Work hours outside of class will be listed under the Work Effort (Hours) column. All team members hours will be added together for total hours worked.

The only major cost currently required is the labor development of project. The software application be installed and hosted on any basic Windows/Linux server. The software application can also be accessed by any common web browser. Hardware cost is estimated based on needing a server, a device with a web browser and a scanner for the most basic function and utility.

Table 9 Project Budget

				Ongoing Annual		
	Rate Per/Hr	Work Effort (Hours)	1 X Costs	Rate Per/Hr	Work Effort (Hours)	1 X Support Cost
Labor - IT	20	100	\$ 2,000.00	20		
Labor - External	0	0	\$ -	0	0	\$ -
Software - External			\$ -			
Hardware - External			\$ 1,500.00			
Misc.			\$ -			
TOTAL			\$ 3,500.00			\$ -

Problems Encountered and Analysis of Problems Solved:

- One problem encountered and faced was the use of a very complex and in-depth developed open-source software. Snipe-IT is our code base and project that we have continued developing from. It is a project that has many different developers and has been around for a while. This led to a struggle of understanding how it was developed and how everything works together. Eventually, this was resolved by just spending more time and familiarizing ourselves with how the project was developed and how everything works together.
- A problem related to this was some of our developers were struggling to understand the code or get everything set up and started. This was different codes and environments from what they were used to. This was resolved by developers helping each other out to get this set up, as well as teaching each other the code.
- Another problem encountered and faced was the implementation of what was planned. Originally, there was more to be developed, but it turns out that Snipe-IT already had those features built in. This led to a struggle of figuring out what steps we could take or do next.
- A major problem was that most of the group members were full-time students at UC, and were also full-time employees at large companies. All of us struggled to balance our regular courses, the senior design project, our jobs for us to survive and our personal lives/wellbeing. In the end, we were able to make time to complete everything and survive without dropping our grades, losing our jobs or our mental wellbeing mostly. We found time to work together and complete our Senior Design Project successfully.

Conclusion

There were many lessons learned so far, it would be impossible to list them all. Some were technical lessons, while others were administrative and life lessons. We also developed and enhanced some different abilities/skills during this project. Some of which are listed below:

- We learned more about open-source software usage
- We learned more about networking and hosting
- We learned about adapting to changes
- We learned about working together and helping each other in different ways
- We improved our system administration skills
- We improved our database skills using different tools such as MySQL and MariaDB
- We improved our coding skills in PHP with using Laravel
- We improved our communication skills with our team and advisor
- We improved our time management skills
- We improved our presentation skills over time

The next steps and plans for Security Assets & Information Management System may be to continue to add some small features and resolve any minor or previously unnoticed errors or bugs. However, we believe that we have created an overall efficient and useful product, focused on solving Security Specialists' problems in their job duties and improving our National Security. We also believe that it is a very flexible and customizable tool/software, with plenty of further potential for features and development for scalability.

References

- Department of Defense. (2016, May 18). National Industrial Security Program Operating Manual. *DoD 5220.22-M*. Department of Defense. Retrieved from <https://www.esd.whs.mil/portals/54/documents/dd/issuances/dodm/522022m.pdf>
- DoJ Office of Public Affairs. (2021, February 25). *Former Air Force Contractor Pleads Guilty to Illegally Taking 2,500 Pages of Classified Information*. Retrieved from The United States Department of Justice: <https://www.justice.gov/opa/pr/former-air-force-contractor-pleads-guilty-illegally-taking-2500-pages-classified-information>
- Snyder, W. E. (2015). Leaks and Their Consequences: A Guide to the Controversy Over Secrecy vs. Open Government. *American Intelligence Journal*, 32(2), 13–16. Retrieved from <http://www.jstor.org/stable/26202131>
- Young, M. D. (2014). National Insecurity: The Impacts of Illegal Disclosures of Classified Information. *A Journal of Law and Policy for the Information Society*, vol. 10, no. 2 (2014), 367-406. Retrieved from <https://kb.osu.edu/handle/1811/73356>