

System and Software Architecture Description (SSAD)

Mission Science Information and Data Management System

Team#06

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Version History

Date	Author	Version	Changes made	Rationale
10/10/11	Yujie Chen	1.0	<ul style="list-style-type: none"> Original template for use with Instructional ICM-Sw v1.0 	<ul style="list-style-type: none"> Initial draft for use with Instructional ICM-Sw v1.0
10/14/11	Yujie, Hardik	1.1	<ul style="list-style-type: none"> Update All the UML Class Diagrams and all the tables(Some table numbers are not correct as we are working on the tables as suggested by TA in the core FC package) 	<ul style="list-style-type: none"> Use RSM to model all class Diagrams
10/23/11	Wei Tan, Yujie Chen	1.2	<ul style="list-style-type: none"> Modify part 2.1.3, sort the User Case in the right order 	<ul style="list-style-type: none"> Inclusion for DC package
11/20/11	Wei Tan, Yujie Chen	1.3	<ul style="list-style-type: none"> Split user cases in more elaborate way, restructure the document. Finished section 3 	<ul style="list-style-type: none"> According to comments, corrected defects in SSAD document FOR Draft TRR package
12/04/11	Yujie chen	1.4	<ul style="list-style-type: none"> Added ER diagram that containing all fields of tables which are user friendly 	<ul style="list-style-type: none"> For TRR package
12/12/11	Yujie chen	1.5	<ul style="list-style-type: none"> Removed the duplicated actors in use case Corrected the use case diagram 	<ul style="list-style-type: none"> For final deliverables

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1. Introduction

1.1 Purpose of the SSAD

The purpose of the SSAD is to document the results of the object-oriented analysis and design (OOA&D) of the system being developed. The SSAD is used by the builder (programmer) as reference to the system architecture. The system being developed should be faithful to the architecture specified in the SSAD. Furthermore, the SSAD is used by the maintainer and clients to help understand the structure of the system once the proposed system is delivered.

1.2 Status of the SSAD

Version 1.4:

Added the Entity Relation Diagram in to this document;

This is the final version of SSAD document.

2. System Analysis

2.1 System Analysis Overview

The primary purpose of Mission science information and data management system is to keep track of Inventory, lesson plan, students, so that administrator can better manage his budget and improve their teaching quality. By allowing administrator to perform longitudinal study based on the data, he can output more detailed and accurate report than it used to be. The proposed goal will be realized by integrating 5 different databases, and we are going to develop friendly user interface to enhance both the efficiency and durability of the system.

2.1.1 System Context

Figure 1 shows operational context of the Mission Science Data management System.

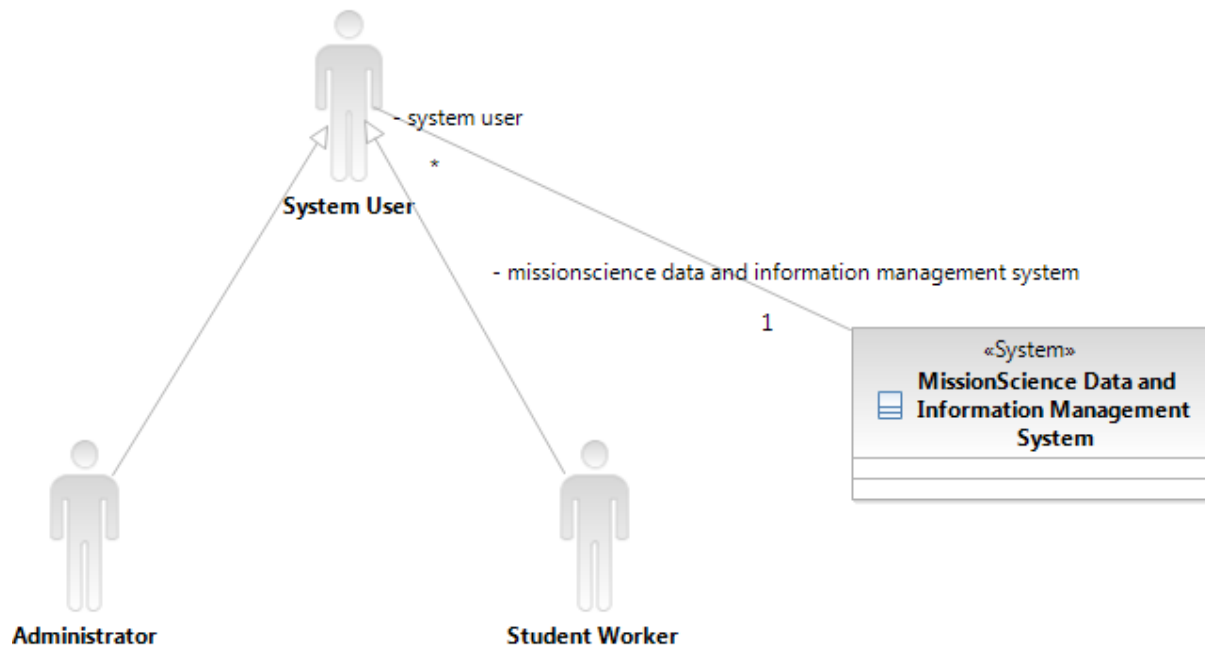


Figure 1: System Context Diagram

Table 1 Actors Summary

Actor	Description	Responsibilities
System User	Has profile in system, can be either an Administrator or a student worker	<ul style="list-style-type: none"> Operate the system and manage the data in the system. Check in and check out items from the inventory Attach demo video to lesson plan Attach picture to certain items in inventory
Administrator	An ultimate user of the system, our client Darin	<ul style="list-style-type: none"> Manage all data merged form 5 database of old system Supervise student worker Maintain all inventory project information

Actor	Description	Responsibilities
System User	Has profile in system, can be either an Administrator or a student worker	<ul style="list-style-type: none">• Operate the system and manage the data in the system.• Check in and check out items from the inventory• Attach demo video to lesson plan• Attach picture to certain items in inventory
Student worker	students working for administrator	<ul style="list-style-type: none">• Initial input of student Attendance sheet so as to create enrollment history in database for administrator to generate longitudinal study report

2.1.2 Artifacts & Information

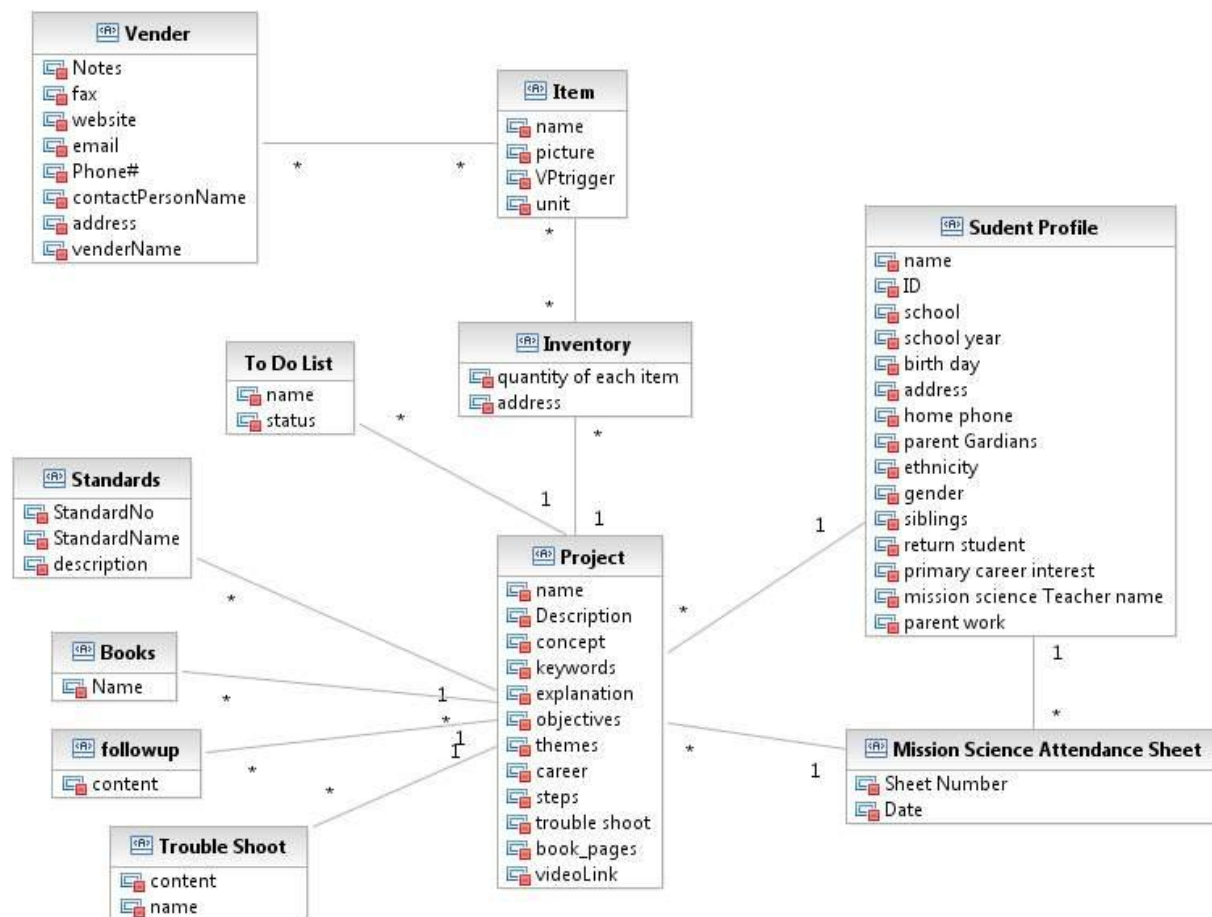


Figure 2: Artifacts and Information Diagram

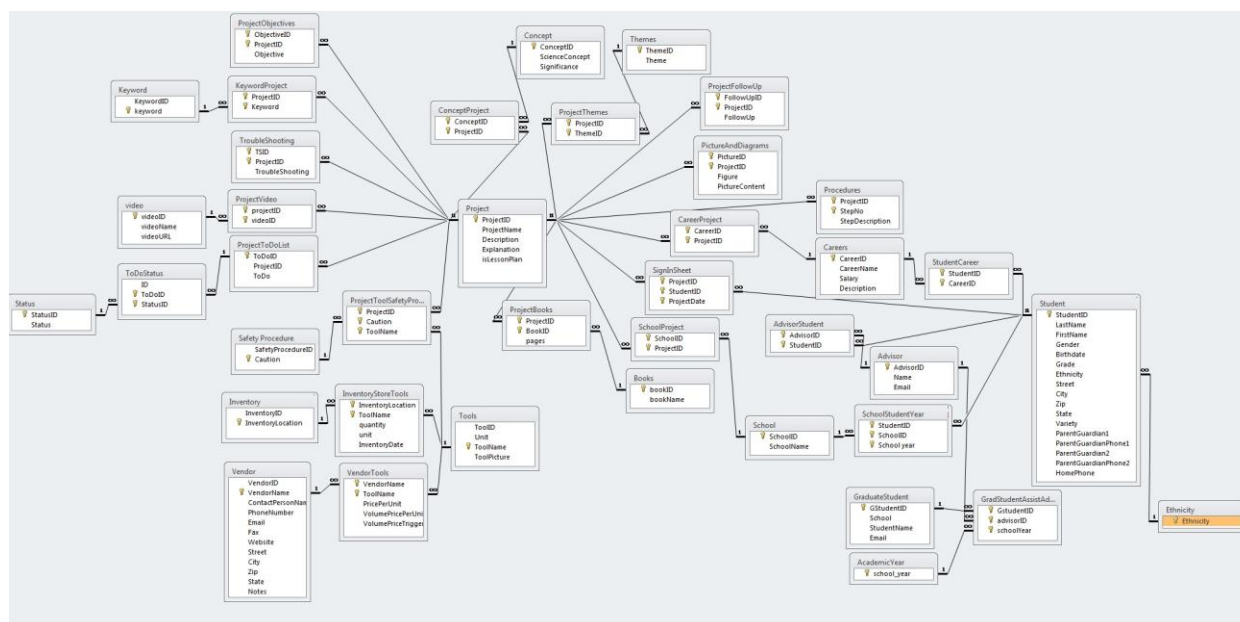


Figure 3: Entity Relation Diagram**Table 2 Artifacts and Information Summary**

Artifact	Purpose
ATF1- Standards	Could be National and State Standards, describing the attribute of project
ATF2-Item	Materials used in the project showed in the inventory list. Contains price, amount, so that project can make use of it
ATF3- Project	Teacher will create a project by submitting Project form which includes keywords description , standards and so forth
ATF4- Inventory	Essentially maintain the amount of each items in each location, so that all user of the system will know if items is still enough for lesson and experiment to continue
ATF5- Mission Science Attendance Sheet	Will contain information of student, project and enrolled year.
ATF6- Student Profile	Including student demographic information
ATF7- Books	Include book name, describe book that project refers
ATF8-Vender	Vender that provides and sales items.
ATF9- To Do List	Things that still needs to do for the project. Include name and status
ATF10-Followup	Include follow up content
ATF11-Trouble Shoot	Include name and content of trouble shoot for project

2.1.3 Behavior

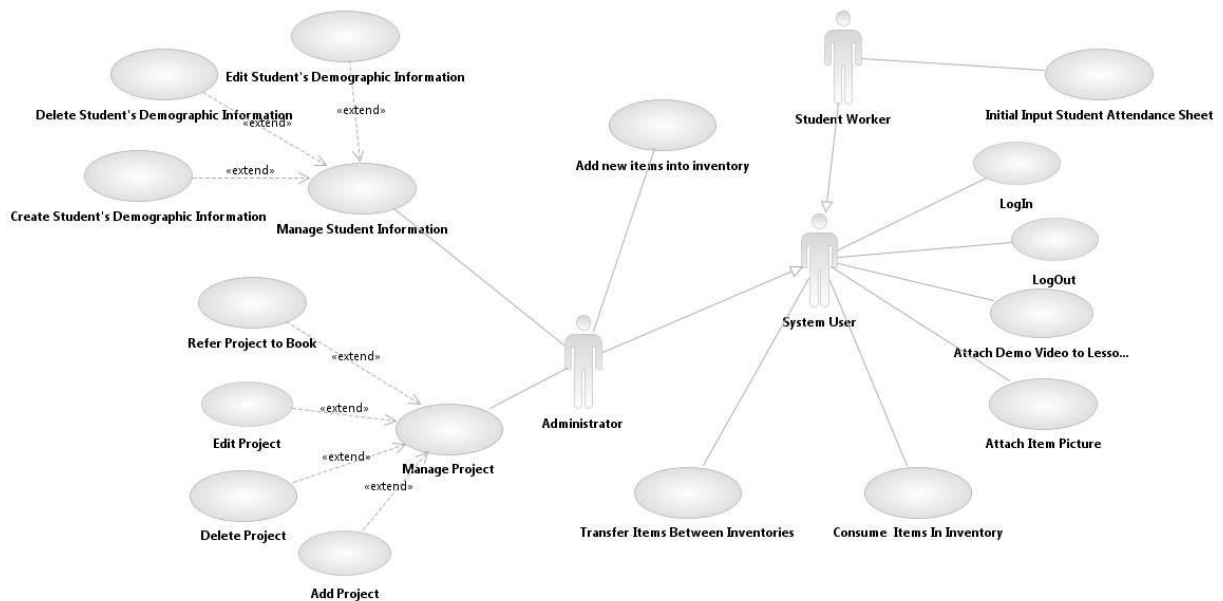


Figure 4: Process Diagram

2.1.3.1 Administrator System behaviors

2.1.3.1.1 Add Project

Table 3 Process Description-Add Project

Identifier	UC-1 Add Project
Purpose	Add Project
Requirements	WC_626 [Lessons] Want to be able to add lessons as new lessons are created WC_625 From the lesson plan category, want the actual background information, standards aligned to keywords, picture, and how to do the lesson.
Development Risks	Checking if the required arguments are specified i.e. whether the topic is specified and it does not have the same name as any other. If its edit or delete, then checking if the lesson plan exists already
Pre-conditions	The user is an administrator user. The user is logged into system. System database is properly initialized.
Post-conditions	If the procedure process successfully, the Projects will be created in the databases

Table 4 Typical Course of Action-Create new project

Seq#	Actor's Action	System's Response
1	Fill out Create Project	
2	Click Submit button	
3		Process & stores it in the database and shows a confirmation page or message and get back to the dashboard

2.1.3.1.2 Edit Project

Table 5 Process Description-Edit Project

Identifier	UC-2 Edit Project
Purpose	Edit Project
Requirements	WC_625 From the project category, want the actual background information, standards aligned to keywords, picture, and how to do the lesson.
Development Risks	Checking if the required arguments are specified i.e. whether the topic is specified and it does not have the same name as any other. If its edit or delete, then checking if the project exists already
Pre-conditions	The user is an administrator user. The user is logged in to the system. System database is properly initialized.
Post-conditions	If the procedure process successfully, the Projects will be modified in the databases

Table 6: Typical Course of Action- Edit project

Seq#	Actor's Action	System's Response
1	Click on projects that need to be edited	
		Direct user to an edit page
2	Modify project fields	
3	Click submit button	
4		Confirmation message and jump back to dashboard

2.1.3.1.3 Delete Project

Table 7: Process Description-Delete Project

Identifier	UC-3 Delete Project
Purpose	Delete Project
Requirements	WC_625 From the project category, want the actual background information, standards aligned to keywords, picture,

	and how to do the lesson.
Development Risks	Checking if the required arguments are specified i.e. whether the topic is specified and it does not have the same name as any other. If its edit or delete, then checking if the project exists already
Pre-conditions	The user is an administrator user. The user is logged in to system. System database is properly initialized.
Post-conditions	If the procedure process successfully, the Projects will be deleted in the databases

Table 8: Typical Course of Action- Delete project

Seq#	Actor's Action	System's Response
1	Click on projects that need to be deleted	
2		Direct user to an delete page. Show the message are you sure you want to delete this?
3	Click submit button	
4		Confirmation message and jump back to dashboard

Table 9: Alternative Course of Action- Incomplete Form

Seq#	Actor Actions	System Response
1	Fill in some or no fields	
2	Click submit the form	
3		Check the completeness & uniqueness of the form.
4		Reloads the form page, and using red tag to indicate the incomplete fields

2.1.3.1.4 Add student information

Table 10: Process Description – Add Student Information

Identifier	UC- 4: Add Student Information
Purpose	Add the student information and generate reports
Requirements	WC_633: From the student database, need the student demographic data
Risks	If students with same name and day of birth with be rejected by the system because logically it is the same person

Pre-conditions	The user is an administrator user. The user is logged into system. System database is properly initialized
Post-conditions	Add student data to the database successfully

Table 11: Typical Course of Action – Add Student Information

Seq#	Actor Actions	System Response
1	Click on the add new student form	
2		Shows the form
3	Enter all the data	
4	Click on the Submit	
5		Check for the validity. If valid. Process the form, show success message & return to the dashboard
6		If not valid, show the fields in red, which are not valid
7	If not valid update the info & follow from step 4	

2.1.3.1.5 Edit Student Information

Table 12: Process Descriptions – Edit Student Information

Identifier	UC- 5: Edit Student Information
Purpose	Edit the student information and generate reports
Requirements	WC_633: From the student database, need the student demographic data
Risks	N/A
Pre-conditions	The user is an administrator use. The user is logged into system. System database is properly initialized. The student steps into new grade.
Post-conditions	Get student data modified successfully in the database.

Table 13: Typical Course of Action – Edit Student Information

Seq#	Actor Actions	System Response
1	Select option of edit from dashboard	
2		Show a textfield, to enter name of the

		student or a dropbox
3	Enter the name of the student	
4	Click on the Submit	
5		Give a list with the radiobox of people with same name
6	Select the radiobox	
7		Show the info as a form of the student
8	Edit the information	
9	Click on submit	
10		Check for the validity. If valid. Process the form, show success message & return to the dashboard
11		If not valid, show the fields in red, which are not valid
12	If not valid update the info & follow from step 8	

2.1.3.1.6 Delete Student Information

Table 14: Process Description – Delete Student Information

Identifier	UC- 6: Delete Student Information
Purpose	Delete the student information and generate reports
Requirements	WC_633: From the student database, need the student demographic data
Risks	N/A
Pre-conditions	The user is an administrator user. The user is logged into system. Database is initialized properly.
Post-conditions	Delete student data from database successfully.

Table 15: Typical Course of Action – Delete Student Information

Seq#	Actor Actions	System Response
1	Select option of Delete from dashboard	
2		Show a textfield, to enter name of the student
3	Enter the name of the student	
4	Click on the Submit	
5		Give a list with the checkbox of people with same name
6	Select the checkbox of students	

	you want to delete	
7	Click Delete	
8		Show success message and go back to dashboard

2.1.3.1.7 Refer project to book

Table 16: Process Description- Refer project to book

Identifier	UC-7 Refer project to book
Purpose	Link book with project so that project can have “experiment” activity
Requirements	WC_632: From the books/experiments categories, want the descriptions of the projects that are in the books, materials, pictures, standards, and key words (similar to WC 625) WC_637: Want the books and project categories "linked" so that you have the ability at any site to determine if there are enough materials for any project (Related to 630). Want to be able to see whether or not there are enough materials without having to manually check.
Development Risks	Book should exist
Pre-conditions	User is logged in the system as an administrator. Project has no book referred.
Post-conditions	Certain book and its book range will be linked to project

Table 17: Typical Course of Action-Refer project to Book

Seq#	Actor's Action	System's Response
1	Select add the Book to project	
2		Form containing books and project is returned
3	Link those 2 fields	
4	Press Submit button	
5		Process it, show success message and return to dashboard if no error, else show the form with red fields if any error
6	Modify if any error and follow step 4	

2.1.3.1.8 Generate Report

Table 18: Process Description-Generate Report

Identifier	UC-9 Generate Report
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Purpose	To publish summary of student progress
Requirements	WC_644: Higher level access for Darin to be able to run queries/reports (either in Access interface or some easily maintainable interface)
Development Risks	The data should not be mixed and the results should be accurate
Pre-conditions	User is logged in the system. Sufficient amount of data has been entered to feed the report
Post-conditions	Report with the criteria specified

Table 19: Typical Course of Action-Generate Report

Seq#	Actor's Action	System's Response
1	Click Generate Reports button	
2		Popup the window of input box
3	Input SQL statements	
4	Press confirm button	
5		Show the reports generated

2.1.3.2 User tasks

2.1.3.2.1 User Login

Table 20: Process Descriptions - Login

Identifier	UC- 10: Login
Purpose	Determine the role of user and display corresponding management screen to user
Requirements	WC_644: Higher level access for Darin to be able to run queries/reports (either in Access interface or some easily maintainable interface)
Development Risks	To see if this functionality is available in MS Access
Pre-conditions	User information already in the user database
Post-conditions	User is authorized with appropriate functions he can perform to the system

Table 21: Typical Course of Action – Login: Successful

Seq#	Actor Action	System Response
1	System user Enters a user name and password	
2	Clicks Login button	
3		Check if the username and password

		match up with records in user table
4		Redirect users to user center pages

Table 22: Alternate Course of Action – Login: Failure

Seq#	Actor Action	System Response
1 - 3	Refer to typical course of action	
4		Displays An error message: “username or password is wrong” in a dialog box
5	Clicks OK button	
6		Redirects the user to the login page

2.1.3.2.2 Logout

Table 23: Process Descriptions – Logout

Identifier	UC- 11: Logout
Purpose	To log out of the system
Requirements	WC_644: Higher level access for Darin to be able to run queries/reports (either in Access interface or some easily maintainable interface)
Risks	None
Pre-conditions	The User is logged in the system
Post-conditions	The User session terminated

Table 24: Typical Course of Action – Logout

Seq#	Actor Actions	System Response
1	User clicks the “log out” button	
2		Kill the user object in system
2		Display a message: “you have logged out of the system” in a dialog box
4	Click OK button	
5		Redirect the Log in sheet

2.1.3.2.3 Transfer items between inventories

Table 25: Process Description-transfer items between inventories

Identifier	UC-12 transfer items between inventories
Purpose	Maintain inventory levels so that materials are available when necessary and ensure that complete shortage never occurs

Requirements	WC_628: From the inventory category, want to have quantity and location of each type of material/tool WC_636: Want the inventory from the project and the book experiments database "linked" so that there is commonality between the terms.(Means Here we just need the materials would be inputted by Darin and the student worker will just select it) WC_631: [Inventory] Store Vendor and pricing information WC_630: [Inventory] Check in/check out system(Just want to know how may materials are available at a location)
Development Risks	Inventory location might be created not on purpose
Pre-conditions	User is logged in the system. User is all system users. Inventory database is up-to-date; each inventory maintains a list of items and its amount information.
Post-conditions	Inventory database will hold an updated count of each material item

Table 26: Typical Course of Action- transfer items between inventories

Seq#	Actor's Action	System's Response
1	Log in to the system as a student user	
2	Access Inventory database	
		Display list of inventory items
3	Click on inventory item to be transferred	
4		Select from location and to location
5	Input amount needs to be transferred	
6	Click submit the form	
7		Display updated current count and picture of selected item just modified

Table 27: Alternative Course of Action- Incomplete Form

Seq#	Actor Actions	System Response
1	Fill in some or no fields	
2	Click submit the form	
3		Check the completeness & uniqueness of the form
4		Reload the form page, and using red tag to indicate the uncompleted fields

2.1.3.2.4 Consume items in inventories

Table 28: Process Description-consume items in inventories

Identifier	UC-14 Consume items in inventories
Purpose	Maintain inventory levels so that materials are available when necessary and ensure that complete shortage never occurs
Requirements	WC_628: From the inventory category, want to have quantity and location of each type of material/tool WC_636: Want the inventory from the project and the book experiments database "linked" so that there is commonality between the terms.(Means Here we just need the materials would be inputted by Darin and the student worker will just select it) WC_630: [Inventory] Check in/check out system(Just want to know how may materials are available at a location)
Development Risks	Amount might out of bound if student enters a unrealistic number
Pre-conditions	User is logged in the system. User is system users. Inventory database is up-to-date; each inventory maintains a list of items and its amount information.
Post-conditions	Inventory database will hold an updated count of each material item

Table 29: Typical Course of Action- transfer items between inventories

Seq#	Actor's Action	System's Response
1	Log in to the system as a student user	
2	Access Inventory database	
		Display list of inventory items
3	Click on inventory item to be consumed	
4		Select location
5	Input amount needs to be consumed	
6	Click submit the form	
7		Display updated current count and picture of selected item just modified

Table 30: Alternative Course of Action- Incomplete Form

Seq#	Actor Actions	System Response
1	Fill in some or no fields	
2	Click submit the form	

3		Check the completeness & uniqueness of the form
4		Reload the form page, and using red tag to indicate the uncompleted fields

2.1.3.2.5 Attach item pictures

Table 31: Process Description- Attach picture to item

Identifier	UC-15 Attach picture to item
Purpose	Link item picture to item so that make it easy for student work to pick up right item in inventory
Requirements	WC_629: [Inventory] Want to have pictures of what each type of tool/material looks like so that new student workers/teachers can input inventory from the materials in the storage room
Development Risks	The picture might not show if it is not in a format that supported by our NDI product
Pre-conditions	User is logged in the system as a student worker. Items in our database has no picture linked
Post-conditions	Items has a picture to show how it looks like

Table 32: Typical Course of Action- Attach picture to item

Seq#	Actor's Action	System's Response
1	Log in to the system as a student user	
2	Access Inventory database	
		Display list of inventory items
3	Click on inventory item to be link picture with	
4		Select from local file
5	Click submit	
6		Display confirm information

2.1.3.3 Student Worker Tasks

2.1.3.3.1 Update student attendance using attendance sheet

Table 33: Process Description- Update student attendance using attendance sheet

Identifier	UC-13 Update student attendance using attendance sheet
Purpose	Record the records that in which year the student get enrolled based on the attendance sheet, for the user to organize the student information in a clear way.
Requirements	WC_640: Would like to be able to calculate the cost per student for the program. Just need to retrieve the data from everywhere. So that Darin can do a calculations WC_635: For the sign in category, want projects the students work on cataloged by school year, site, project and teacher
Development Risks	Attendance sheet has invalidated format so that it will not be able to accepted to database
Pre-conditions	User is a logged in the system as a student worker. Student information has already existed in the database. And the primary key for the attendance sheet is only.
Post-conditions	Student information database will be updated

Table 34: Typical Course of Action-Update student attendance using attendance sheet

Seq#	Actor's Action	System's Response
1	Log into system as a student worker	
2	Access the project database	
3	Search for an activity by typing its name into a text field and clicking the submit button	
4		Display a list of activities that match the requested search
5	Click on the project name	
6		Display a drop-down list of schools served by Mission Science
7	Select the school from the drop-down list	
8		Show a list of students for that school
9	Select the students who have completed the activity and click submit button	
10		Display the project name and an updated list of students who have

		completed that project
--	--	------------------------

Table 35: Alternative Course of Action- Incomplete Form

Seq#	Actor Actions	System Response
1	Fill in some or no fields	
2	Click submit the form	
3		Check the completeness & uniqueness of the form
4		Reload the form page, and using red tag to indicate the uncompleted fields

3. NDI/NCS Interoperability Analysis

3.1 Introduction

In our “Feasible Evidence Document” we have described the evidence that we can use one COT to fully satisfy our win condition.

Our team is Single NDI team; we are using Microsoft Access 2010 as our COT product.

3.1.1 COTS / GOTS / ROTS / Open Source / NCS

Table 36: NDI Products Listing

NDI/NCS Products	Purposes
Microsoft Access 2010	Manage the database and provide switchboard for implementing logic functions

3.1.2 Connectors

Since Mission science is a Single NDI project, Connector is not applicable to our team.

3.1.3 Legacy System

Since Mission science is a Single NDI project, Connector is not applicable to our team.

3.2 System Structure

Figure 5: Deployment Diagram

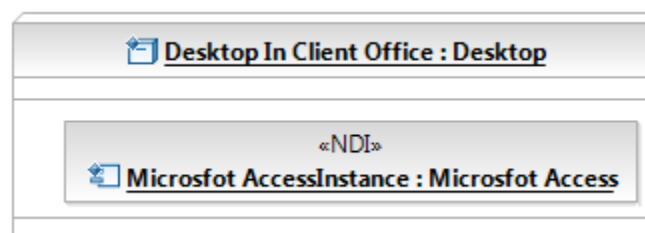
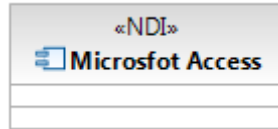
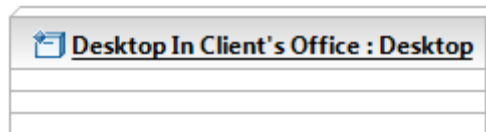


Figure 6: Software Component Diagram**Figure 7: Hardware Component Diagram**

3.3 Evaluation Summary

Table 37: NDI Evaluation

NDI	Usages	Comments
Microsoft Access	100%	Can satisfy client win condition.