System and Software Architecture Description (SSAD)

Somatis Web and Data Services

Team 3

Name	Roles
Fall 2012	
Fei Qu	Project Manager
Jizhou Lu	Life Cycle Planner, Operational Concept Engineer
Xianan Fan	Prototyper
Dian Peng	Architect, Feasibility Engineer
Qiuyang Liu	Requirements Engineer
Jordan Padams	IIV&V
Spring 2013	
Jordan Padams	All

4/1/13

Version History

Date	Author	Version	Changes made	Rationale
08/25/05	PA	2.0	• Original template for use with Instructional ICM-Sw v1.0	• Initial draft for use with Instructional ICM-Sw v1.0
10/11/12	DP	2.1	• Added content for section 1 • Added content for section 2	• To describe the document goal and status • To describe the system context and use case.
10/22/12	DP	2.2	• Fix the use case diagram bug • Add section 2.2 • Enhance the artifact diagram	• Use case error found
10/24/12	DP	2.3	• Update section 1.0 • Update section 2.0	• Fix bugs in FCP evaluation • Fix bugs in FCP evaluation
10/31/12	DP	2.4	• Update section 1.0 • Update section 2.0	• Reduce redundant information • Fix bugs in the section
11/5/12	DP	2.5	• Update section 2.0	• Add requirements for security and fix bugs.
11/14/12	DP	2.6	• Update Section 3.0	• Add content of technology independent design
11/25/12	DP	2.7	• Update Section 4.0 • Update Section 5.0 • Fix bugs	• Add content of technology dependent design • Add content of architecture pattern ,style and framework • Fix bugs raised in evaluation
11/26/12	DP	3.0	• Update section 4.0 • Update section 5.0	• Add content of technology dependent design • Add content of architecture pattern ,style and framework
11/27/12	DP	3.1	• Update section 4.0 • Update section 5.0	• Fix bugs in content • Fix bugs in content
12/7/12	DP	3.2	• Update section 1.0 • Update section 2.0 • Update section 3.0 • Update section 4.0	• Fix bugs in Bugzilla • Fix bugs in Bugzilla • Fix bugs in Bugzilla • Fix bugs in Bugzilla
12/12/12	DP	3.3	• Update section 3.0 • Update section 4.0	• Fix bugs in design class • Fix bugs in design class
12/15/12	DP	3.4	• Update section 3.0 • Update section 4.0	• Fix bugs pointed out by TA • Fix bugs pointed out by TA
2/11/13	JP	4.0	• Migrate all applicable information from Architected-Agile template to NDI NCS template.	• Project has transitioned from architected-agile to NDI/NCS process.

2/12/13	JP	4.1	• Create new User Forum use case	• User forum is an OC and requires an accompanying UC

Table of Contents

Table of Tables

Table of Figures

1. Introduction

1.1 Purpose of the SSAD

The purpose of this document is to detail the architecture of the system as elicited through object-oriented analysis and design. The diagrams and use cases detailed below will be used by programmers, maintainers, and stakeholders in an effort to better understand the system context, as well as ensure the system captures stakeholder needs.

1.2 Status of the SSAD

Version 4.0 of this document represents a major overhaul from previous versions as the project transitions from the Architected-Agile process framework to NDI-intensive. Portions of the previous version of this document were copied and/or modified as needed (system context, artifacts, etc.) while others were developed from scratch (interoperability analysis).

2. System Analysis

2.1 System Analysis Overview

The primary purpose of Somatis Web And Data Services is to provide the necessary marketing front and infrastructure in and effort to increase Somatis Sensor Solutions' revenue and profits. The system can be broken down into two prominent components: Web Services and Data Services. The Web Services component will provide a basic website with content and information about the company, social media infusion, user guides/forums, and a sensor configurator "store" that will allow customers to purchase Somatis proprietary sensors. The Data Services component will provide a web interface for the customers to leverage the data gathered from the Somatis-purchased sensors. The Data Services will be included in all sensor purchases.

2.1.1 System Context

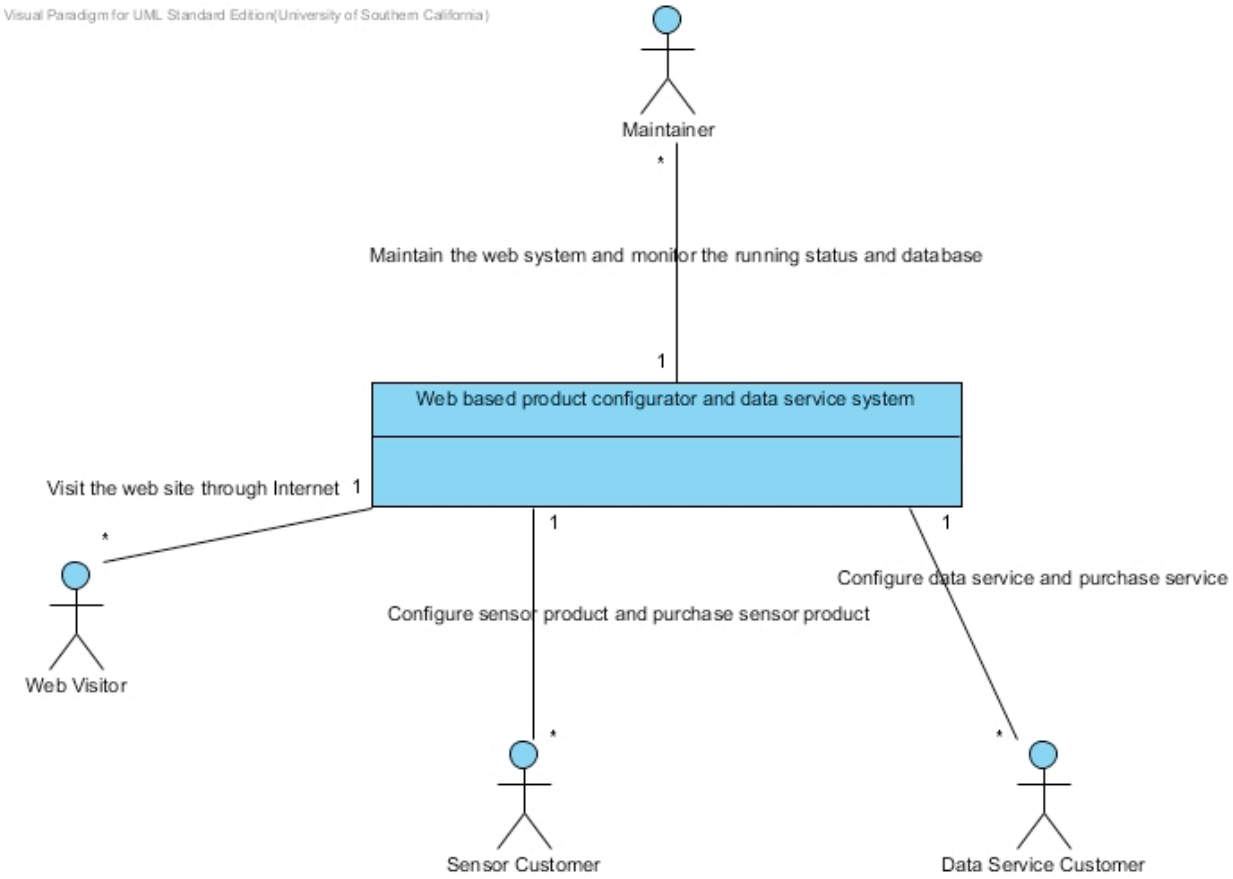

Figure 1: System Context Diagram

Table 1: Actors Summary

Actor	Description	Responsibilities
Maintainer	An administrative user of the system that will have permissions to modify all configurations, account information, etc.	- Update web content - Manage data service users - Manage data service devices
Sensor Customer	A user that intends to purchase a sensor from Somatis via the sensor configurator.	- Configure the sensor product via the sensor configurator - Submit purchase to sales team
Data service customer	A data service customer is a user that has purchased a sensor from Somatis, which include a data service, and wishes to access their data via a web interface.	- Review sensor data via data manipulation interface - Export sensor data - Configure data manipulation interface
Web Visitor	A user of the website	- Browse the website

2.1.2 Artifacts & Information

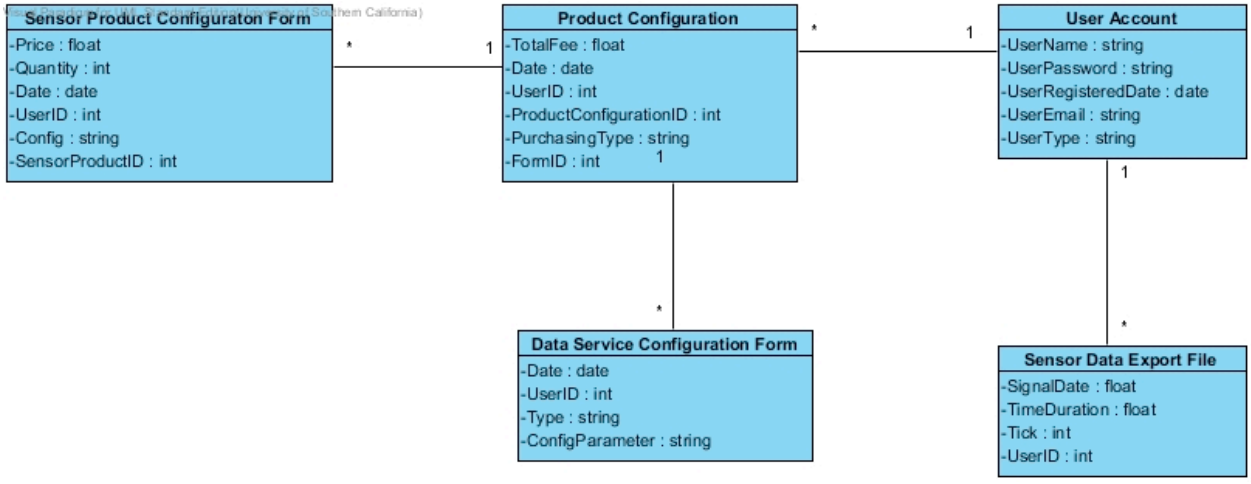

Figure 2: Artifacts and Information Diagram

Table 2: Artifacts and Information Summary

Artifact	Purpose
ATF-1: Sensor product configuration form	This form is used to describe and record the sensor product and it is generated by the user through using configuration module on the web site.
ATF-2:	This is form contains the detail information of the data

Data service configuration form	service configuration and it is generated by the user through using data service configuration module on the web site.
ATF-3: Sensor data export file	This file contains the formatted sensor data and it is generated by the indication of the customer who wishes to have the sensor data locally in the file.
ATF-4: Product Configuration	This table contains all the historical information of a certain user in terms of its purchasing operation , no matter he/she purchase a sensor product or purchase certain data service.
AFT-5: User Account	This table contains all the information for a specific user.

2.1.3 Behavior

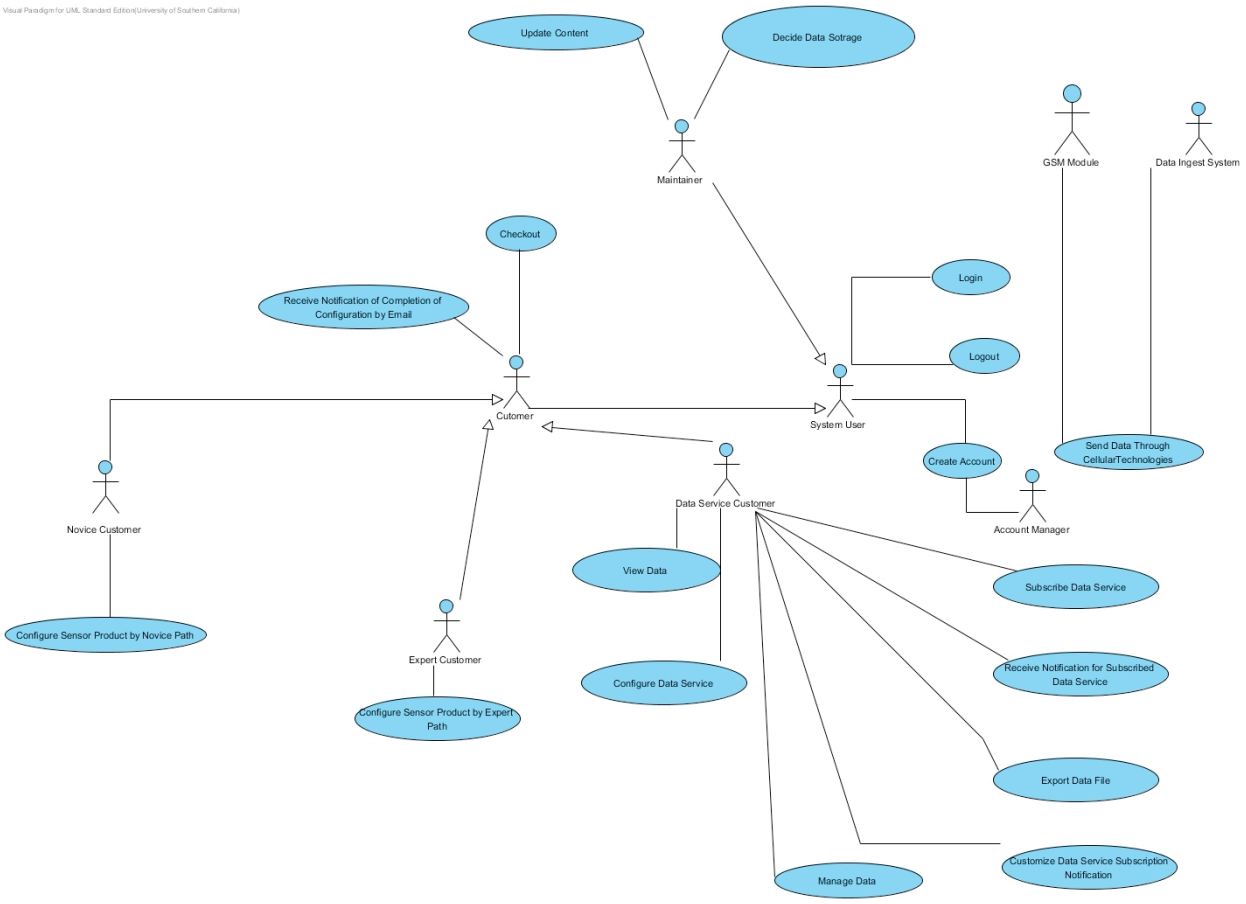

Figure 3: Process Diagram

2.1.3.1 Capability - Login

2.1.3.1.1 Use case 1

Process Description: Login

Identifier	UC-1
Purpose	Determine if a person has the required information to login the system, and assign corresponding system privilege to him/her.
Requirements	WC_1546
Development Risks	Potentially, there exist possible changes in the future about the system privilege which can lead to future modification of the account module.
Pre-conditions	The customer is on the right page provided the login UI.
Post-conditions	The customer is on the specific return page displaying login status

Typical Course of Action – Login: Successfully

Seq#	Actor's Action	System's Response
1	The customer types in the username and password.	
2	The customer clicks the login button.	
3		The system checks the username and password.
4		The system links the user directly to the main control panel page for user.

Exceptional Course of Action – Login: Failure

Seq#	Actor's Action	System's Response
1	The customer types in the username and password.	
2	The customer clicks the login button.	
3		The system checks the validation of the username and password and find out the username is not existed or password unmatched information to tell user what to do next.
4		The system replies actor with a login failure page.

Exceptional Course of Action – Login: Failure

Seq#	Actor's Action	System's Response
1	The customer types in the username and password.	
2	The customer clicks the login button.	
3		The system checks the username finding out the input character is not valid.
4		The system replies actor with a login failure page.

Exceptional Course of Action – Login: Failure

Seq#	Actor's Action	System's Response
1	The customer continuously login system.	
2		The system receives the account information from same customer continuously and all these information is invalid.
3		The continuous login trier try time has reached the system threshold.
4		The system blocks the user account.

2.1.3.1.2 Use case 2

Process Description: Logout

Identifier	UC-2
Purpose	The user logout the system.
Requirements	WC_1545
Development Risks	None
Pre-conditions	The user must have login the system successfully.
Post-conditions	The user logouts the system.

Typical Course of Action –Logout: Successfully

Seq#	Actor's Action	System's Response
1	The user presses the logout button in the web page. (All the page will have logout button)	
2		The system invalidates all the user login

		states and removes all the related information from the running system.
3		The system will also reply a logout page to user.

Alternate Course of Action – Logout: Successfully

Seq#	Actor's Action	System's Response
1	The user closes the browser and does not login the web site for more than 48 hours.	
2		The system automatically logout the user for the cookie is lost.

Alternate Course of Action – Logout: Successfully

Seq#	Actor's Action	System's Response
1	The user checked the "Remember Me" box when login.	
2	The user does not login the web site continuously for 14 days.	
3		The system will logout the user automatically.

2.1.3. 1.3 Use case 3

Process Description: Create Account

Identifier	UC-3
Purpose	The actor can create a new account.
Requirements	WC_1544
Development Risks	None
Pre-conditions	The customer is on the create account page to create the account.
Post-conditions	The customer has a new account to login the system.

Typical Course of Action –Create Account: Successfully

Seq#	Actor's Action	System's Response
1	The customer types in the username which should be unique inside of the system, and types in the password.	
2	The customer presses "create	

	account" button.	
3		The system will send an email to the system account manager .The email will include all the user registered data.
4		The account manager will check the email and create an account for customer manually.
5		The system will return a notification email to user with the account information created for him/her.

Exceptional Course of Action – Create Account: Failure

Seq#	Actor's Action	System's Response
1	The customer types in the new username and password.	
2	The customer clicks the login button.	
3		The system will send an email to the system account manager .The email will include all the user registered data.
4		The account manager checks the qualification of the customer and find out he/she is not qualified.
		The system will return an email with information notifying that account manager will not create account for him/her.

2.1.3.2 Capability - Update Content

2.1.3.2.1 Use case 4

Process Description: Update Content

Identifier	UC-4
Purpose	The content maintainer can update the web static and dynamic content through specific interface without any web-development knowledge. The system provides WYSIWYG interface for content maintainer to update the content.
Requirements	WC_1418
Development Risks	None
Pre-conditions	The maintainer has visited the corresponding content update UI page.
Post-conditions	The web content has been updated.

Typical Course of Action –Update Content: Successfully

Seq#	Actor's Action	System's Response
1	The content maintainer selects which part should be updated.	
2	The content maintainer types in the new information and then press update button.	
3		System stores the new content into the database and then display new content in the web site.

Exceptional Course of Action –Update Content: Failure

Seq#	Actor's Action	System's Response
1	The content maintainer selects which part should be updated.	
2	The content maintainer types in the new information and then press update button.	
3		The system checks the content of the update and finds out the inconsistence in the system and refuse to update the content.
4		The system returns back an error page to the maintainer.

2.1.3.3 Capability - Data Ingest Service

2.1.3.3.1 Use case 5

Process Description: Subscribe Data Service

Identifier	UC-5
Purpose	The customer can subscribe any data service in terms of its interests as long as the customer has purchased certain data service.
Requirements	WC_1422
Development Risks	Pub/sub system typically is a very complicated system .The development team may take advantage of the existed middleware or NDI .However the potentially problem of integration and tailoring may cause the project delivery late.
Pre-conditions	The customer has visited the subscribe data service UI page.
Post-conditions	The customer can have the subscribed data once the data is published and can view these data through data interface.

Typical Course of Action –Subscribe Data Service: Successfully

Seq#	Actor's Action	System's Response
1	The customer types in the interested information.	
2	The customer press subscribe button.	
3		The system receives the requests and stores this requests in the database and return back a successful page.

Exceptional Course of Action –Subscribe Data Service: Failure

Seq#	Actor's Action	System's Response
1	The customer types in the interested information source and want to subscribe this data.	
2	The customer press subscribe button.	
3		System finds out the customer does not have the qualification to subscribe this information for the customer may not purchase the corresponding service.

2.1.3.3.2 Use case 6

Process Description: Receive Notification for Subscribed Data Service

Identifier	UC-6
Purpose	The customer can receive notification (email or text) when the subscribed information has been published.
Requirements	WC_1422
Development Risks	Pub/sub system typically is a very complicated system .The development team may take advantage of the existed middleware or NDI .However the potentially problem of integration and tailoring may cause the project delivery late.
Pre-conditions	The customer registered email is existed and the server for this email is set up properly.
Post-conditions	The customer receives a notification and knows its subscribed information has been published.

Typical Course of Action – Receive Notification for Subscribed Data Service: Successfully

Seq#	Actor's Action	System's Response

1	The Data Ingest Server stores the data into the database.	
2		The system checks the sensor data database and finds out new data has been stored inside of database.
3		The system checks whether these new data meet the subscription demands required by the data service customer.
4		The system sends the notification information to data service customer.
5	The data service customer receives the notification.	
6		The system marks this new data as old data.

Typical Course of Action – Receive Notification for Subscribed Data Service: Failure

Seq#	Actor's Action	System's Response
1	The Data Ingest Server stores the data into the database.	
2	The data cannot be stored into database since the space which customer purchased is not enough.	
3		The system receives this exceptional status information.
4		The system sends out notification email for customer to notify that his/her space is not enough.

Alternate Course of Action –Receive Notification for Subscribed Data Service: Successfully

Seq#	Actor's Action	System's Response
1	The Data Ingest Server stores the data into the database.	
2		The system checks the sensor data database and finds out a data has sent to the database.
3		The system delays the sending of the notification for the system is busy.
4		When the system becomes not busy, the system dispatches the queued

		notification.

2.1.3.3.4 Use case 7

Process Description: Send Data through Cellular Technologies

Identifier	UC-7
Purpose	The customer can send the sensor generated data through cellular technologies.
Requirements	WC_1428
Development Risks	This requirement needs a modem which should be integrated inside of the chip of the sensor. Additionally, we need to develop a small embedded system to perform the task of client based on specific transformation protocol. These hardware related program is a very big risk since all of us lacks the detail information of the target system. What is more, a back-end system should be developed in the server side to listen to the sensor generated data sending to the database. This piece of software is also potential complicated software which may lead to the project failure.
Pre-conditions	The sensor data has been sampled and generated.
Post-conditions	All the remote sensor generated data has been stored into the database properly.

Typical Course of Action –Send Data through Cellular Technologies: Successfully

Seq#	Actor's Action	System's Response
1	The sensor will transform the data to the modem.	
2	The modem will first send its authentication information to the server.	
3		The server side receives the authentication information and checks the validation of the sensor and then returns back the information.
4	The sensor gets the returned instruction and sends the data to the server.	
5		The server receives the data.
6		The server stores the data into the database.

Exceptional Course of Action –Send Data through Cellular Technologies: Failure

Seq#	Actor's Action	System's Response
1	The sensor will transform the	

	data to the modem.	
2	The modem will first send its authentication information to the server..	
3		The data cannot send out through cellular way for the signal is weak.
4		The system will miss a generated data from sensor.

Exceptional Course of Action –Send Data through Cellular Technologies: Failure

Seq#	Actor's Action	System's Response
1	The sensor will transform the data to the modem.	
2	The modem will first send its authentication information to the server.	
3		The server side receives the data, but the data is incorrect due to the transportation.
4		The system will store the incorrect data, and set up a warning flag to indicate such data contains unbearable error.

Exceptional Course of Action –Send Data through Cellular Technologies: Failure

Seq#	Actor's Action	System's Response
1	The sensor will transform the data to the modem.	
2	The modem will first send its authentication information to the server.	
3		The server is busy and unable to handle the requests.
4		The system will miss some data packet.

Exceptional Course of Action –Send Data through Cellular Technologies: Failure

Seq#	Actor's Action	System's Response
1	The sensor will transform the data to the modem.	
2	The modem will first send its authentication information to the server.	
3		The authentication information sending by the sensor is error.

4		The server will return back error information to the sensor client. (The sensor may be other hacking program to mimic as a sensor.)

Exceptional Course of Action –Send Data through Cellular Technologies: Failure

Seq#	Actor's Action	System's Response
1	The sensor or other fake sensor sends its authentication information to the server continuously.	
2		The server receives error authentication information from same connecting address for many times.
3		The continuous error times reaches the threshold for distinguish DOS attack source.
4		The system blocks this connecting address to prevent connection by this address.

2.1.3.4 Capability Data Service Interface

2.1.3.4.1 Use case 8

Process Description: Customize Data Service Subscription and Notification

Identifier	UC-8
Purpose	The customer can choose certain type of notification, through email or text.
Requirements	WC_1422
Development Risks	Pub/sub system typically is a very complicated system .The development team may take advantage of the existed middleware or NDI .However the potentially problem of integration and tailoring may cause the project delivery late.
Pre-conditions	The customer is on the right page for customizing the subscription.
Post-conditions	The customer can receive the notification based on his/her required means.

Typical Course of Action –Customize Data Service Subscription and Notification: Successfully

Seq#	Actor's Action	System's Response

1	The customer selects the way to receive notification, an email or a text.	
2		The system receives the request and stores it inside of database.
3		The system returns back a page to tell the customer this requests has been approved.

Typical Course of Action –Customize Data Service Subscription and Notification: Failure

Seq#	Actor's Action	System's Response
1	The customer selects the way to receive notification, an email or a text.	
2		The system receives the requests and finds out the customer does not have this privilege to customize the service.
3		The system returns back a page to tell the customer this requests has been refused.

2.1.3.4.2 Use case 9

Process Description: Manage Data

Identifier	UC-9
Purpose	The customer can manage its data.
Requirements	WC_1430
Development Risks	None
Pre-conditions	The user is on the right page for managing the data.
Post-conditions	The customer performs his/her required tasks.

Typical Course of Action –Manage Data: Successfully

Seq#	Actor's Action	System's Response
1	The customer chooses the type of management for data. The type typically is creating, deleting, updating and searching.	
2	The customer chooses which kind of data or what specific data .The searching operation	

	may not contain this step.	
3		The system receives this request and then performs the task.
4		The system obtains the outcome and then returns back a page can view the outcome of data to the actor.

Typical Course of Action –Manage Data: Failure

Seq#	Actor's Action	System's Response
1	The customer chooses the type of management for data. The type typically is creating, deleting, updating and searching.	
2	The customer chooses which kind of data or what specific data .The searching operation may not contain this step.	
3		The system receives this request and then performs the task.
4		The system cannot find out any related information the user indicates (this situation is always happening when the search function is performed , the system cannot search any useful information in terms of the actor's requests)
5		The system returns back a page indicating no results can be shown.

Typical Course of Action –Manage Data: Failure

Seq#	Actor's Action	System's Response
1	The customer tries to update certain information in his/her sensor database.	
4		The systems receive the requests and try to perform the tasks, however the updating will cause inconsistence problem in database and no task will be performed.
5		The system returns back a page indicating no results can be shown.

2.1.3.4.3 Use case10

Process Description: Export Data File

Identifier	UC-10
Purpose	The customer can export data file .The data file is plain text file.
Requirements	WC_1431
Development Risks	None
Pre-conditions	The user is on the right page for exporting the data and the data is existed.
Post-conditions	The file is generated and the actor can view the content in the file properly.

Typical Course of Action –Export Data File: Successfully

Seq#	Actor's Action	System's Response
1	The customer chooses the source of information which will be exported into a file.	
2	The customer press export.	
3		The system automatically obtains the source information and then performs the conversion and exporting function.
4		The system stores this file into the customer database and return a page with link the actor can download this file.
5	The customer link to the page and download the exported file.	
6		The system starts exporting the file content.

Typical Course of Action –Export Data File: Failure

Seq#	Actor's Action	System's Response
1	The customer chooses the source of information which will be exported into a file.	
2	The customer press export.	
3		The system automatically obtains the source information and then performs the conversion and exporting function.
4		Since the database for this user is not enough to store the exported file, the system cannot completely finish this task.
5		The system returns back an error page

		to tell the user the space is not enough to perform the export file operation.

2.1.3.4.4 Use case11

Process Description: View Data

Identifier	UC-11
Purpose	The customer can view their data inside of the browser.
Requirements	WC_1429,WC_2272
Development Risks	The view data use case contains specific visualization method for signal data which can induce many risks. Until now, we have not found any useful library can help us display dynamic FFT graph, we may need to implement our own method to show the FFT image. This can induce much complexity for project.
Pre-conditions	The customer is on the page for viewing the data.
Post-conditions	The customer can view its data inside of the browser properly.

Typical Course of Action –View Data: Successfully

Seq#	Actor's Action	System's Response
1	The customer selects the specific data source which will be visualized.	
2	The customer selects specific visualize method.	
3	The customer selects specific visualizing configuration parameter.	
4	The customer selects visualizing data points.	
5		The system converts the data selected by user and use specific visualize method to visualize the data.
6		The system returns back the visualized data page to user.

Typical Course of Action –View Data: Failure

Seq#	Actor's Action	System's Response
1	The customer selects the specific data source which will be visualized.	
2	The customer selects specific visualize method.	

3	The customer selects specific visualizing configuration parameter.	
4	The customer selects visualizing data points.	
5		The system receives its requests and find out its request is impossible to finish in reasonable time (this is typically because too wide data range for visualizing using FFT or other graph method).
6		The system returns an error page to user.

Typical Course of Action –View Data: Failure

Seq#	Actor's Action	System's Response
1	The customer selects the data source using file structure-like interface.	
2	The customer press view button.	
3		The data cannot view directly through the web-browser for the data is binary format, which is meaningless to show as a text format.

Typical Course of Action –View Data: Failure

Seq#	Actor's Action	System's Response
1	The customer selects the data source using file structure-like interface.	
2	The customer selects FFT to view the data.	
3		The data for visualizing as FFT graph is not the data about signal or it lacks the vector parameter to visualize as FFT diagram.
4		The system returns back a page to tell the user the FFT conversion cannot be down.

2.1.3.5 Capability - Sensor Configurator

2.1.3.5.1 Use case 12

Process Description: Configure Sensor Product by Expert Path

Identifier	UC-12
Purpose	The customer can configure a sensor product by expert path .It allows the most flexibility and provide all the technical detail to the expert user.
Requirements	WC_1432
Development Risks	None
Pre-conditions	The customer is on the page for configuring the sensor product by expert path.
Post-conditions	The customer fill in all the require form for configuring the sensor product and all these information has been stored in the database and system replies to user with a confirmation page.

Typical Course of Action –Configure Sensor Product by Expert Path: Successfully

Seq#	Actor's Action	System's Response
1	The customer fills all the form and required area of the configuration web page.	
2	The customer clicks finish button.	
3		The system stores the configuration form and replies to actor with a certification page.
4		The system sends out a email to the maintainer at the same time.

Typical Course of Action –Configure Sensor Product by Expert Path: Failure

Seq#	Actor's Action	System's Response
1	The customer fills all the form and required area of the configuration web page.	
2	The customer clicks finish button.	
3		The system checks all the filled form and finds out the form is not complete or have error.

4		The system returns back the page which has error and guiding information for the customers.

Typical Course of Action –Configure Sensor Product by Expert Path: Failure

Seq#	Actor's Action	System's Response
1	The customer fills all the form and required area of the configuration web page.	
2	The customer clicks finish button.	
3		The system checks all the filled form and finds out the form is not complete or have error.
4		The system returns back the page which has error and guiding information for the customers.

2.1.3.5.2 Use case 13

Process Description: Configure Sensor Product by Novice Path

Identifier	UC-13
Purpose	The customer can configure a sensor product by novice path .This path will provide enough information and guidance for configuring a certain sensor product.
Requirements	WC_1433
Development Risks	None
Pre-conditions	The customer is on the right page for configuring the sensor product by novice page.
Post-conditions	The customer fill in all the require form for configuring the sensor product and all these information has been stored in the database and system replies to user with a confirmation page.

Typical Course of Action –Configure Sensor Product by Novice Path: Successfully

Seq#	Actor's Action	System's Response
1	The customer fills all the required form and receives the hints and guidance to help making decision.	
2	The customer clicks finish	

	button.	
3		The system stores the configuration form and replies to actor with a certification page.

Typical Course of Action –Configure Sensor Product by Novice Path: Failure

Seq#	Actor's Action	System's Response
1	The customer fills all the form and required area of the configuration web page.	
2	The customer clicks finish button.	
3		The system checks all the filled form and finds out the form is not complete or have error.
4		The system returns back the page which has error and guiding information for the customers.

2.1.3.5.3 Use case 14

Process Description: Receive Notification of Completion of Configuration by Email

Identifier	UC-14
Purpose	The customer can receive a notification email when he/she finish the configuration of sensor product.
Requirements	WC_1438
Development Risks	None
Pre-conditions	The customer has finished the product configuration and presses the finished button.
Post-conditions	The customer receives the email.

Typical Course of Action – Receive Notification of Completion of Configuration by Email: Successfully

Seq#	Actor's Action	System's Response
1	The customer finishes the configuration and presses the finish button.	
2		The system raises a notification event and dispatches an email to the address

		which is provided by user when creating the account.

2.1.3.5.4 Use case 15

Process Description: Configure Data Service

Identifier	UC-15
Purpose	The customer can configure his/her data service by web interface. This operation includes choosing the storage size of its individual database.
Requirements	WC_1436
Development Risks	The requirements hope the user can store their data as long as they are customer .This requirement can be hard to achieve when the customer size grows to a big number in future.
Pre-conditions	The customer is on the right page for configuring the data service.
Post-conditions	The customer configures his/her data service successfully.

Typical Course of Action –Configure Data Service: Successfully

Seq#	Actor's Action	System's Response
1	The customer logins the system and choose the service he/she want to configure, and then follows the guidance to complete the configuration procedure.	
2		The system then receives the configuration requests and checks the validation of the user (mainly the payment aspects).
3		The system returns a status page telling the user requests has been handled.

Typical Course of Action –Configure Data Service: Failure

Seq#	Actor's Action	System's Response
1	The customer logins the system and choose the service he/she want to configure, and then follows the guidance to complete the configuration procedure.	
2		The system then receives the configuration requests and checks the validation of the user (mainly the payment aspects).
3		The system finds out the customer does

		not have such privilege to configure the data service (he/she may not make the payment or the user group is not able to perform configuring service).
4		The system refuses the requests and sends back a page to guide him/her to change his/her privilege.

2.1.3.5.4Use case 16

Process Description: Checkout

Identifier	UC-16
Purpose	The customer can check out after he/she selects the product.
Requirements	WC_1557
Development Risks	
Pre-conditions	The customer has configured the product and at the right page for checkout.
Post-conditions	The customer makes the payment properly.

Typical Course of Action –Configure Data Service: Successfully

Seq#	Actor's Action	System's Response
1	The customer presses the checkout button.	
2		The system returns a page with the form for detail payment information.(This form may varies corresponding to different payment method)
3	The customer fills in the blank with his/her detail information.	
4		The system checks the information and makes the transaction.

Typical Course of Action –Configure Data Service: Failure

Seq#	Actor's Action	System's Response
1	The customer presses the checkout button.	
2		The system checks out that the customer does not have privilege to check out since he/she has not become a registered member of the system.
3		The system returns the "create account" page to the customer.

Typical Course of Action –Configure Data Service: Failure

Seq#	Actor's Action	System's Response
1	The customer presses the checkout button.	
2		The system returns a page with the form for detail payment information.(This form may varies corresponding to different payment method)
3	The customer fills in the entire blank with information, however this information contains error.	
4		The system checks all the information and finds out error.
5		The system stops continue the payment process and return back an error page to the customer to tell him/her where the error is.

2.1.3.6 Capability – User Forum

2.1.3.6.1 Use Case 17

Process Description: Add Comment

Identifier	UC-17
Purpose	Website user can post a question to be answered by Somatis staff or leave feedback.
Requirements	WC_1415
Development Risks	
Pre-conditions	The website user has navigated to the user forum page and the system has displayed the page without error.
Post-conditions	The admin user accepts the post.

Typical Course of Action: Submit Comment - Success

Seq#	Actor's Action	System's Response
1	The website user enters name, email address, and comments, and presses submit comment.	
2		The system sends an email notification to the system administrator with alert that comment has been posted.
3		The system notifies the user the comment has been submitted.

Typical Course of Action: Submit Comment - Failure

Seq#	Actor's Action	System's Response
1	The website user does not enter at least one of the following: name, email address, comment, and then select Submit.	
2		The system throws an error notifying the user that a value for name, email address, and comment are required.

3. NDI/NCS Interoperability Analysis

3.1 Introduction

The NDI we plan on using for this system are as follows:

- MySQL – database management software that is built into our hosting service.
- Apache – web server software that is built into our hosting service.
- WordPress – CMS and WYSIWYG editor used to develop website (see FED for feasibility analysis).
- Exosite Portals – M2M data services that provide visualizations and management of sensor devices (see FED for feasibility analysis).

3.1.1 COTS / GOTS / ROTS / Open Source / NCS

Table 3: NDI Products Listing

NDI/NCS Products	Purposes
MySQL	Provide database for WordPress. Dependency of WordPress.
Apache	Provide web server hosting and enable PHP for WordPress.
WordPress	Provide CMS for creating and updating web content.
Exosite Portals	Provide M2M data services for Somatis Sensor Solutions customers.

3.1.2 Connectors

- PHP/MySQL – allows PHP in WordPress to connect to MySQL databases
- mod_php – Apache module that allows PHP to be enabled on Apache Web Server.

3.1.3 Legacy System

- PHP/MySQL – current website does not leverage database but does have this connector enabled (enabled by default by hosting service).

- mod_php – current website uses basic PHP content that is enabled using this Apache module.

3.2 System Structure

When trying to run the software, the Data Intensive URL was not working. However, it is known that these components are compatible through testing of services. This is evident through testing the functionality at the websites http://www.somatistechnologies.com/ and http://www.somatistechnologies.com/wordpress .

3.3 Evaluation Summary

Table 4: NDI Evaluation

NDI	Usages	Comments
MySQL	Database	Built into hosting service. Dependency of WordPress. Will not cause issues with other components. No reason to use different database
Apache	Web Service	Built into hosting service. Dependency of WordPress. Will not cause issues with other components. No reason to use different web server.
WordPress	CMS/WYSIWYG Editor	Requires PHP, MySQL, and Apache to run, but since they are a part of the hosting service, this is not an issue.
Exosite Portals	Data Services	This component is entirely external to the rest of the system and will not cause any compatibility issues.