

Software Requirements Specification

for

Grid 3D Application

Version 1.0 To Be Approved

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Table of Contents

Document Introduction.....	3
PRODUCT CONSTRAINTS.....	4
1.1 Purpose of the the Product.....	4
1.1.1 Background to the Project Effort.....	4
1.1.2 Goals of the Product.....	4
1.2 Client, Customer and other Stakeholders.....	5
1.2.1 The Client.....	5
1.2.2 The Customer.....	5
1.2.3 Other Stakeholders.....	5
1.3 The Users of the Product.....	6
1.4 Requirements Constraints.....	7
1.4.1 Solution Constraints.....	7
1.4.2 Implementation Environment.....	7
1.4.3 Partner Applications.....	7
1.4.4 How Long to Develop?.....	7
1.5 Naming Conventions and Definitions.....	8
1.6 Assumptions.....	8
FUNCTIONAL REQUIREMENTS.....	9
2.1 The Scope of the Product.....	9
2.1.1 The Context of the Work.....	9
2.1.1.1 Initialisation.....	9
2.1.1.2 Running.....	10
2.1.2 Work Partitioning.....	11
2.1.3 Product Boundary.....	12
2.2 Functional and Data Requirements.....	14
2.2.1 Functional Requirements.....	14
2.2.2 Data Requirements.....	14
NON-FUNCTIONAL REQUIREMENTS.....	15
3.1 Look and Feel Requirements.....	15
3.2 Performance Requirements.....	15

Document Introduction

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PRODUCT CONSTRAINTS

1.1 Purpose of the the Product

1.1.1 Background to the Project Effort

The need for a method of visualisation of biological data has been identified. Currently, there are many groups offering many different tools for visualising data. These visualisation tools provide a range from tabular to three-dimensional graphical views. However, a need has been identified for a tool that can display data in a three dimensional environment, which allows the user to investigate the data and easily see various attributes of the data at a glance.

A need for the above-mentioned tool has been identified and, there being no applicable tool available, a project to create such a tool was conceptualised.

The primary stakeholder (see 1.2.1) has made the case that the tool to be created is of relevance use and there is a real need for it. This need is established through continual use of other similar tools and a continued identification of their shortfalls.

1.1.2 Goals of the Product

We want to give the user the ability to visualise and investigate their data in a three dimensional environment. The user should have the ability to see (at a glance) the differences of various selected attributes of their data.

The overall goal of this product is to provide the users with something that has previously been unavailable.

1.2 Client, Customer and other Stakeholders

1.2.1 The Client

The client for this product is **Dr Delmiro Fernandez-Reyes**, a supervisor at the NIMR. Eventually, the client would like to present and make available the product for the benefit of research merit. The client has said that he is solely responsible for approving changes in the scope of the project.

1.2.2 The Customer

The customer for this product is anyone from the parasitology department at the NIMR, represented here by **Dr Delmiro Fernandez-Reyes**. Potential customers may include anyone who works in the field of research and would find this product useful.

1.2.3 Other Stakeholders

Other stakeholders include:

- Ben Tagger – designer, developer, tester and maintainer.
- Anthony Finkelstein – UCL supervisor of Ben Tagger
- Everyone in the parasitology department at NIMR.

1.3 The Users of the Product

People who may use this product;

- Anyone investigating proteins.
- Research Scientists
- Data-mining Scientists
- Research Students
- Organisations in this field

Some attributes the product might cater for;

- Non-English speakers
- People wanting differing degrees of detail
- People who want to analyse their data (in their preferred format)

For each User, describe as fully as possible all the known attributes, such as;

- Subject matter experience
- Technological experience
- Intellectual abilities
- Attitude to job
- Attitude to technology
- Education
- Linguistic skills

1.4 Requirements Constraints

1.4.1 Solution Constraints

The following specifies constraints on the way that the problem must be solved

- The product must be available on both Windows and Linux operating platforms
- The execution of the application must be kept on the server side.
- The solution must be produced in a timely manner – see time restrictions.

1.4.2 Implementation Environment

This section will describe the technological and physical environment that the product will be installed.

- The product should run on a minimum of a mid-range personal computer.
- The product shall run with the minimum input tools of mouse and keyboard.
- The user must have a capability for creating tab-delimited text files.

1.4.3 Partner Applications

This section will describe some of the applications that are not part of the product, but with which the product will, or may, collaborate.

- Microsoft Windows 98, 2000, NT and XP Operating Systems
- Linux and Solaris Operating Systems
- Matlab – used for some of the pre-product data generations. Matlab can also be used for manipulating the format of the product's required data.
- Tomcat/Apache/Ant – possibly to be used for product deployment

1.4.4 How Long to Develop?

The Grid 3D application was originally developed to be included for a scientific paper to be published at some point in March 2005. It was, therefore, essential that the application be ready by then. The motivation for developing the application within this short time frame was to, firstly, include it in the paper, but also to produce an original product in a constantly advancing genre.

1.5 Naming Conventions and Definitions

This section shall provide a dictionary containing the meaning of all the name used within this requirements specification document.

- Biological data – data of a biological scientific nature generated by some product or process (external to the Grid 3D application). To use the biological data with the Grid 3D application, it must be formatted in the specified manner (see).
- Demonstrator – refers to a user of the Grid 3D application. The demonstrator uses the three dimensional view generated by the application to demonstrate one or more properties of the data to any other person.
- Grid 3D – the application for which this document contains the requirements. For a detailed representation of the Grid 3D application, please refer to the Design document.
- Identifier – refers to a user of the Grid 3D application. The identifier use the application to identify different “points of interest”. For example, a point that is not close to any other point may be of interest. An identifier may become an investigator.
- Investigator – refers to a user of the Grid 3D application. The investigator uses the application in order to find detailed information about specific points. An investigator may originate as an identifier.

1.6 Assumptions

This section contains a list of assumptions that are to be made by the developers.

- The users have the computing skill for basic operation of one of the operating systems documented in 1.4.3. Basic operation entails:
 - starting and terminating an operating system session
 - use of a Java-enabled internet browser
 - competent use of keyboard and mouse
 - basic file handling
 - command line input skills
- The users have access to a minimum specification work station on which to run the product. See 3.3 for minimum requirements for the work station.

FUNCTIONAL REQUIREMENTS

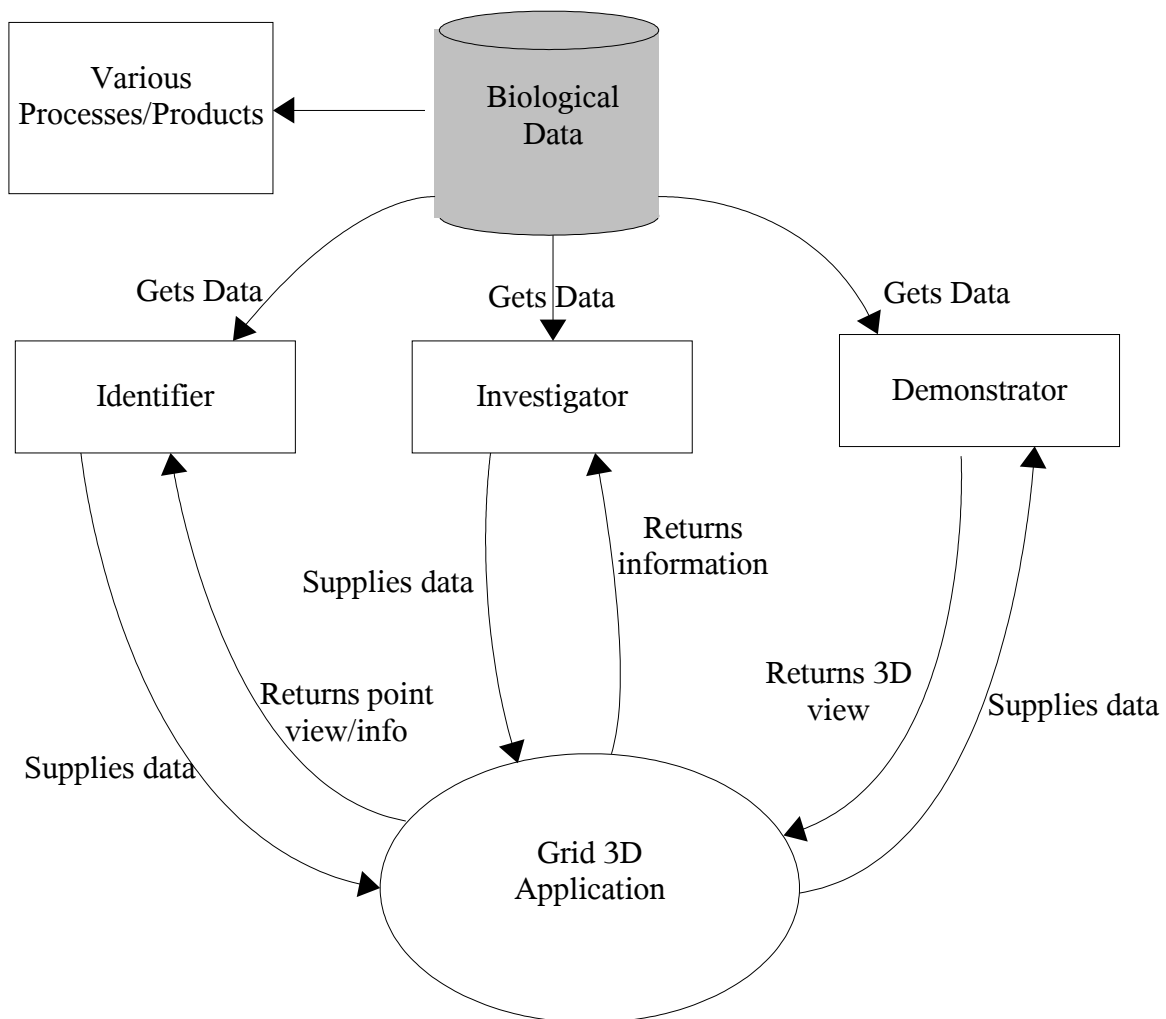
2.1 The Scope of the Product

2.1.1 The Context of the Work

The following diagram represents a context diagram for the Grid 3D application. For a description of any of the below-mentioned names, please refer to 1.5.

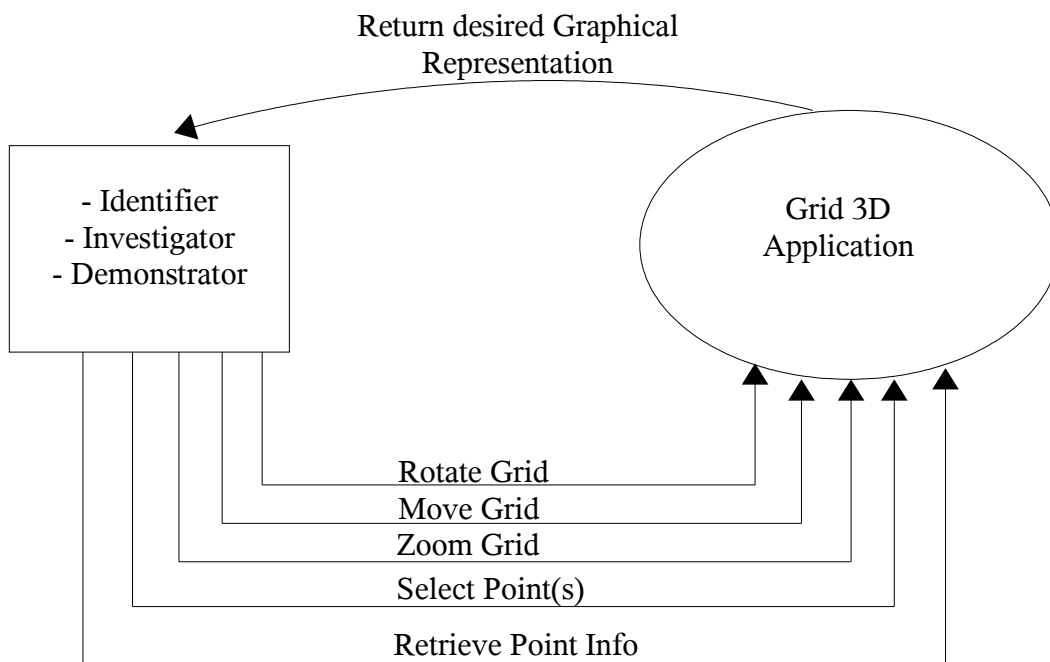
2.1.1.1 Initialisation

The following diagram refers to the initiation phase of the Grid 3D application.



2.1.1.2 Running

The context diagram above represents the Grid 3D application during the initialisation stages. It is important to differentiate this with the work context for the application in a state of running. The following diagram aims to describe the work context for the application when it is being run by the users (identified above). In the following diagram, the users are grouped as one entity. This is for convenience only and should be thought of as separate entities. However, the work context applies to each of them in the same manner and, therefore, have been grouped to further the simplicity and understandability of the diagram.



2.1.2 Work Partitioning

The purpose of this section is to identify all the business events to which the product responds. This is to identify the logical parts of work that can be used as the basis for discovering the detailed requirements.

Event List:

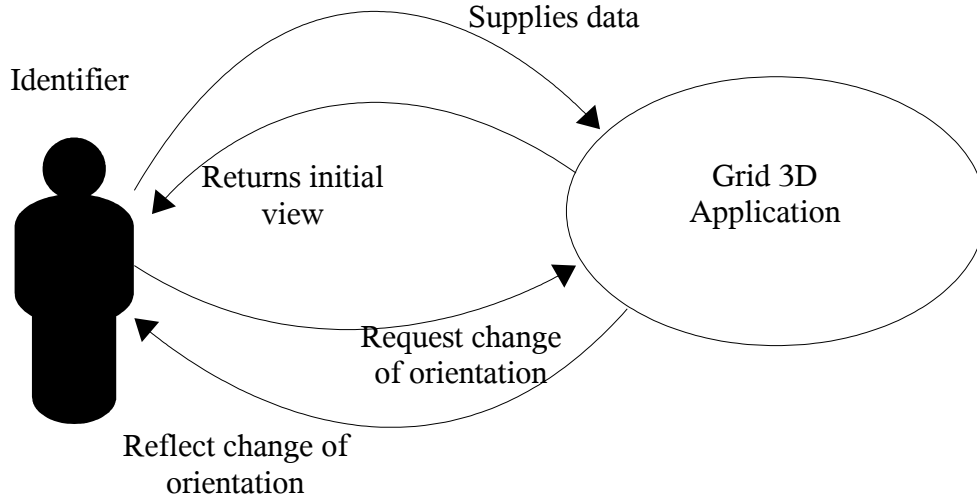
#	<i>Event Name</i>	<i>Input and Output Flows</i>
1	Identifier supplies data	Data (in)
2	Application returns view/info to identifier	Graphical view (out)
3	Investigator supplies data	Data (in)
4	Application returns details to investigator	Textual info (out)
5	Demonstrator supplies data	Data (in)
6	Application provides 3D view	Graphical view (out)
7	User requests change of grid orientation	Mouse movement (in)
8	User selects multiple points	Mouse and Keyboard (in)

2.1.3 Product Boundary

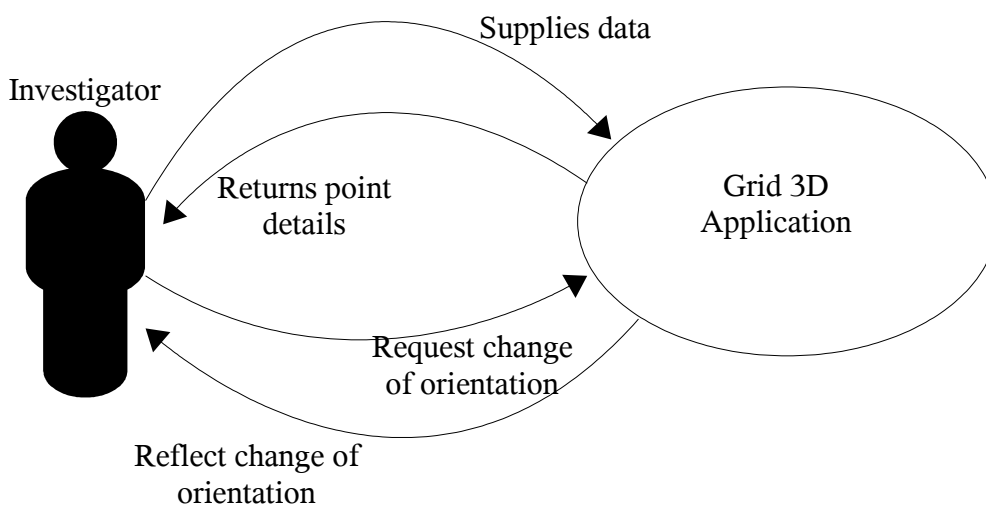
This section aims to generate some use cases for the Grid 3D application. These shall be generated from the events list contained in 2.1.2. It is hoped that use cases can be given that cover all the events listed in 2.1.2. With this in mind, the use cases will cover more than one event as more than one event can be captured with a single use-case.

Use case
1,2,6,7.

for events

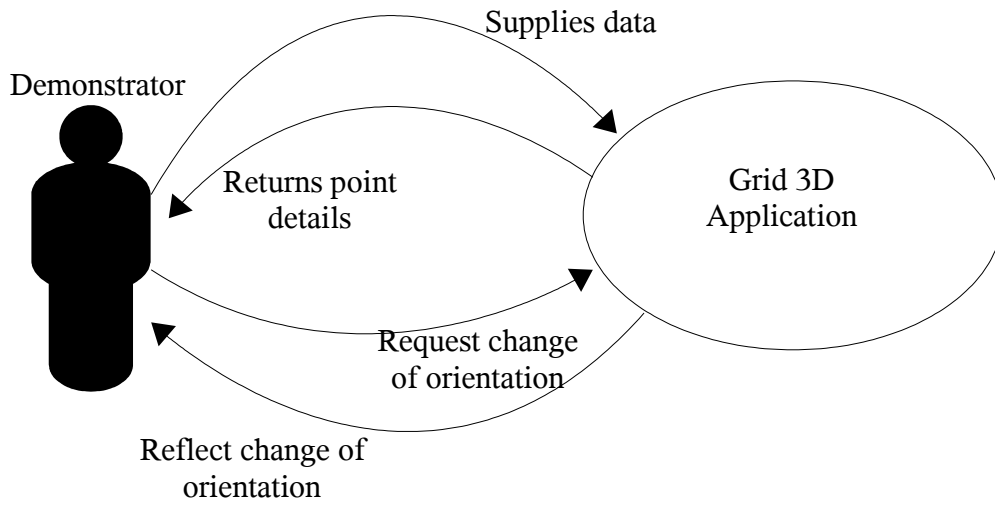


Use case
3,4,6,7



Software Requirements Engineering for Grid 3D Application

Use case
5,6,7



2.2 Functional and Data Requirements

2.2.1 Functional Requirements

This section describes the functional requirements for the Grid 3D application. Each functional requirement should have a fit criterion in order to make it possible to test whether the requirement is implemented as specified in the delivered product.

- The product shall plot the data points in a scientifically correct manner.
- The grid axis should be labelled correctly according to the input from the data file.
- Data points should be coloured in accordance to the cluster number (contained in the data file)
- The product should be able to handle up to 2000 data points.
- A single click of the mouse over a data point should bring up the name of the data point.
- A double-click of the mouse over the data point should cause the application to display all the data point's details.
- The product should allow multiple points to be clicked so that multiple names can be displayed.
- The product should allow the grid to be oriented by the user. Rotation, zoom and move functions should be employed.

2.2.2 Data Requirements

The use of the Grid 3D application involves the user supplying a data file. This data file contains all the information of the points that are to be plotted.

The data file should contain:

- A name for the data point
- 3 parameters from which the data point is to be plotted
- A single parameter to designate the colour of the point. This is the attribute that is to be used as the comparison.
- A description for the data point.

In order for the grid to reflect the nature of the user's data, the system should allow for the user to specify their own axis. With this in mind, the first row of the data file should contain the column headings. The following table proposes the format for the data file.

<i>Name</i>	<i>X_Title</i>	<i>Y_Title</i>	<i>Z_Title</i>	<i>Cluster_Title</i>	<i>Description</i>
Point_Name	X_Value	Y_Value	Z_Value	<number>	<description>

NON-FUNCTIONAL REQUIREMENTS

3.1 Look and Feel Requirements

The product is to be used primarily by research scientists and therefore must have a look and feel appropriate for this use.

These requirements are:

- The points should be large enough to see and select
- The points should not be too big, so as to distort the overall pattern of the point spread.
- The axis should be clearly labelled and easily recognised after the grid has been oriented into a different position.
- The application should be coloured so that the screen shots can be printed out clearly (i.e., black on white background).
- The application should be intuitive and not require any specialist training.

3.2 Performance Requirements

This section aims to specify some of the timing and performance constraints to which the product will aim to adhere.

- The program should start within 30 seconds
 - This depends on the number of data points that are to be plotted.
- The interaction with the data points should have a delay of no longer than 2 seconds.
- The response to a change in the orientation should be fast enough to avoid interrupting the user's flow of thought.