



BIKES4ERP

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Informatics 370 Deliverable 6 – System Documentation



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Virtual Visionaries
GROUP 17

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1. Deliverable Introduction

This deliverable is our documentation for our system, it includes the System Requirements, Complete Documentation from deliverable 1 to 4, Complete Requirements Validation, CRUD Matrix and the Conversion Plan for our system. Through this deliverable we reconcile our internally tested system to the system documentation leading up to now.

2. System Requirements

2.1. Introduction

The requirements form a critical part of the project as it highlights the core functional and non-functional requirements of the system we are developing. This section also clearly identifies the functional expectations of the system.

2.2. Final System Requirements

2.2.1. User Sub-System

- 2.2.1.1. Login
- 2.2.1.2. Logout
- 2.2.1.3. Reset User Password
- 2.2.1.4. Add User
- 2.2.1.5. Search User
- 2.2.1.6. Update User
- 2.2.1.7. Delete User
- 2.2.1.8. Add User Type
- 2.2.1.9. Search User Type
- 2.2.1.10. Update User Type
- 2.2.1.11. Delete User Type

2.2.2. Mechanic Schedule Sub-System

- 2.2.2.1. View Job List
- 2.2.2.2. View Job

2.2.3. Tracking Hardware Sub-System

- 2.2.3.1. Add Antenna
- 2.2.3.2. Search Antenna
- 2.2.3.3. Update Antenna
- 2.2.3.4. Delete Antenna
- 2.2.3.5. Add Tag
- 2.2.3.6. Search Tag
- 2.2.3.7. Update Tag
- 2.2.3.8. Delete Tag

2.2.4. Student Sub-System

- 2.2.4.1. Add Student
- 2.2.4.2. Search Student
- 2.2.4.3. Update Student
- 2.2.4.4. Delete Student
- 2.2.4.5. Capture Student Marks
- 2.2.4.6. Search Student Marks
- 2.2.4.7. Add Mark Type
- 2.2.4.8. Search Mark Type
- 2.2.4.9. Update Mark Type
- 2.2.4.10. Delete Mark Type

2.2.5. Bicycle Sub-System

- 2.2.5.1. Add Bicycle
- 2.2.5.2. Search Bicycle
- 2.2.5.3. Update Bicycle
- 2.2.5.4. Delete Bicycle
- 2.2.5.5. Assign A Bicycle To Student
- 2.2.5.6. Unassign Bicycle From Student
- 2.2.5.7. Assign Tag To Bicycle
- 2.2.5.8. Unassign Tag From Bicycle

2.2.6. Bicycle Part Sub-System

- 2.2.6.1. Add Bicycle Part
- 2.2.6.2. Search Bicycle Part
- 2.2.6.3. Update Bicycle Part
- 2.2.6.4. Delete Bicycle Part
- 2.2.6.5. Add Bicycle Section
- 2.2.6.6. Search Bicycle Section
- 2.2.6.7. Update Bicycle Section
- 2.2.6.8. Delete Bicycle Section

2.2.7. Tracking Sub-System

- 2.2.7.1. Add Log Entry
- 2.2.7.2. Search Log Entry
- 2.2.7.3. Add Route
- 2.2.7.4. Search Route
- 2.2.7.5. Update Route
- 2.2.7.6. Delete Route

2.2.8. Job Tasks Sub-System

- 2.2.8.1. Add Fault Task
- 2.2.8.2. Search Fault Task
- 2.2.8.3. Update Fault Task
- 2.2.8.4. Delete Fault Task
- 2.2.8.5. Add Maintenance Task
- 2.2.8.6. Search Maintenance Task
- 2.2.8.7. Update Maintenance Task
- 2.2.8.8. Delete Maintenance Task

2.2.9. School Sub-System

- 2.2.9.1. Add School
- 2.2.9.2. Search School
- 2.2.9.3. Update School
- 2.2.9.4. Delete School

2.2.10. Job Sub-System

- 2.2.10.1. Report Repair Job
- 2.2.10.2. Complete Job
- 2.2.10.3. Check-In Bicycle
- 2.2.10.4. Schedule Maintenance

2.2.11. Reporting Sub-System

- 2.2.11.1. Generate Mechanic Schedule
- 2.2.11.2. Generate Mechanic Schedule Requirements Report
- 2.2.11.3. Generate Student Report
- 2.2.11.4. Generate Bicycle History Report
- 2.2.11.5. Generate Log Report
- 2.2.11.6. Generate Parts Used Report

2.2.12. Notification Sub-System

- 2.2.12.1. Send Student Did Not Arrive Notification
- 2.2.12.2. Send Student Maintenance Notification

2.2.13. Administration Sub-System

- 2.2.13.1. Backup Data
- 2.2.13.2. Restore Data
- 2.2.13.3. View Audit Trail Log
- 2.2.13.4. Search Audit Trail Entry

2.3. Conclusion

At this point, it is now clear, what is expected of our system. It should be able to fulfil all these functional requirements without fail, as it is what we promised our client.

3. Complete Documentation

3.1. Introduction

This is the update of all our past 4 deliverables to date. They have been reconciled with the current internally tested system functionality to align to the Functional Requirements promised in the section prior to this one.

3.2. Deliverable Documentation

Please refer to Deliverable 1, 2, 3 & 4 documents for the complete Documentation of our system.

3.3. Conclusion

After viewing this documentation, one should have a clear outline of the Documentation of the system and what it ought to do. This will come in handy when considering system expansion and/or maintenance.

4. Validation

4.1. Introduction

The validation lists every requirement in our system. It shows which use cases, processes on the primitive level of the Data Flow Diagrams, entities in the Entity Relational Diagram satisfy the requirements individually to detail. In short, the table below validates the need and usage of each Requirement per subsystem. It also matches them with our internally tested system's screens and the Outputs & reports created.

4.2. Complete Requirements Validation

Sub System	Use Case	Process (DFD)	Entities	Screen	Reports and Other Outputs
1. User	1.1 Login	1.1.1 Display User Login Screen	None	Login	None
		1.1.2 Capture and check User login details have been filled	None	Login	None
		1.1.3 Verify User Login details	User UserType	Login	None
		1.1.4 Display Homepage Screen	AuditTrail	Home	
	1.2 Logout	1.2.1 Display Logout confirmation pop-up	None	Navigation Bar	Notification
		1.2.2 Display Login Screen details	AuditTrail	Login	None
	1.3 Forgot Password	1.3.1 Display Forgot Password Screen	None	Forgot Password	None
		1.3.2 Capture and Validate User Email Address fields are filled	None	Forgot Password	None
		1.3.3 Verify inputted Email Address details	User	Forgot Password	None
		1.3.4 Send Reset password link	None	Forgot Password	Forgot Password Email
		1.3.5 Display Reset password Screen	None	Reset Password	None
		1.3.6 Capture and Verify new User password details	None	Reset Password	None
		1.3.7 Update Password. Display Reset password Successful notification	User AuditTrail	Reset Password	Notification
	1.4 Add User	1.4.1 Display User Management Screen	User UserType	User Management	None
		1.4.2 Display Add User Screen	UserType School AdminSchool	Create User	None
		1.4.3 Capture User details and check that all fields are filled in and an option selected in Combo box	None	Create User	None
		1.4.4 Validate User details	None	Create User	None
		1.4.5 Verify User details	User	Create User	None
		1.4.6 Generate User ID and Save User details	User AdminSchool	Create User Create User	None

		1.4.7 Display Create Successful Notification	AuditTrail	Create User	Notification
	1.5 Search User	1.5.1 Display User management Screen	User UserType	User Management	None
		1.5.2 Capture User Search criteria details	None	User Management	None
		1.5.3 Display Searched User Results	User UserType	User Management	None
		1.5.4 Display Searched User details Screen	User UserType AuditTrail	View User	None
	1.6 Update User	1.6.1 Display Searched User Screen	School AdminSchool	View User	None
		1.6.2 Capture User details and check for empty fields and for unselected combo box	None	View User	None
		1.6.3 Validate updated User details	None	View User	None
		1.6.4 Save updated User details	User AdminSchool	View User	None
		1.6.5 Display Update Successful Notification	AuditTrail	View User	Notification
	1.7 Delete User	1.7.1 Display Searched User Screen details	None	View User	None
		1.7.2 Delete Searched User details	AuditTrail User	View User	None
		1.7.3 Display User Deleted Successfully Notification	AuditTrail	View User	Notification
	1.8 Add User Type	1.8.1 Display User Type Management Screen	UserType	User Type Management	None
		1.8.2 Display Add User Type Screen	None	Create User Type	None
		1.8.3 Capture User Type details and check that all fields are filled in and an option selected in Combo box	None	Create User Type	None
		1.8.4 Validate User Type details	None	Create User Type	None
		1.8.5 Verify User Type Details	UserType	Create User Type	None
		1.8.6 Generate User Type ID and Save User Type details	UserType	Create User Type	None

		1.8.7 Display Create Successful Notification	AuditTrail	Create User Type	Notification
	1.9 Search User Type	1.9.1 Display User Type Management Screen	UserType	User Type Management	None
		1.9.2 Capture User Type Search criteria details	None	User Type Management	None
		1.9.3 Display Searched User Type Results	UserType	User Type Management	None
		1.9.4 Display Searched User Type details Screen	UserType AuditTrail	View User Type	None
	1.10 Update User Type	1.10.1 Display Searched User Type Screen	None	View User Type	None
		1.10.2 Capture User Type details and check for empty fields and for unselected combo box	None	View User Type	None
		1.10.3 Validate updated User Type details	UserType	View User Type	None
		1.10.4 Save updated User Type details	UserType	View User Type	None
		1.10.5 Display Update Successful Notification	AuditTrail	View User Type	Notification
	1.11 Delete User Type	1.11.1 Display Searched User Type Screen	None	View User Type	None
		1.11.2 Delete Searched User Type details	UserType	View User Type	None
		1.11.3 Display User Type Deleted Successfully Notification	AuditTrail	View User Type	Notification
2. Mechanic Schedule	2.1 View Job	2.1.1 Display Job List Screen	Check-In MaintenanceJob MaintenanceJobStatus RepairJob RepairJobStatus Check-InStatus AuditTrail	Job	None
	2.2 View Job List	2.2.1 Display Fault List Screen	FaultType JobFault Section Part JobFaultStatus AuditTrail	Job List	None
3. Tracking Hardware	3.1 Add Antenna	3.1.1 Display Antenna Management Screen	Antenna AntennaStatus	Antenna management	None
		3.1.2 Display Add Antenna Screen	None	Create Antenna	None

		3.1.3 Capture Antenna details and check that all fields are filled in and an option selected in Combo box	None	Create Antenna	None
		3.1.4 Validate Antenna details	None	Create Antenna	None
		3.1.5 Verify Antenna details	Antenna	Create Antenna	None
		3.1.6 Generate Antenna ID and Save Antenna details	Antenna	Create Antenna	None
		3.1.7 Display Create Successful Notification	AuditTrail	Create Antenna	Notification
	3.2 Search Antenna	3.2.1 Display Antenna management Screen	Antenna AntennaStatus	Antenna management	None
		3.2.2 Capture Antenna Search criteria details	None	Antenna management	None
		3.2.3 Display Searched Antenna Results	Antenna AntennaStatus	Antenna management	None
		3.2.4 Display Searched Antenna Details Screen	Antenna AntennaStatus AuditTrail	View Antenna	None
	3.3 Update Antenna	3.3.1 Display Searched Antenna screen	None	View Antenna	None
		3.3.2 Capture Antenna details and check for empty fields and for unselected combo box	None	View Antenna	None
		3.3.3 Validate updated Antenna details	Antenna	View Antenna	None
		3.3.4 Save updated Antenna details	Antenna	View Antenna	None
		3.3.5 Display Update Successful Notification	AuditTrail	View Antenna	Notification
	3.4 Delete Antenna	3.4.1 Display Searched Antenna screen	None	View Antenna	None
		3.4.2 Delete Searched Antenna details	Antenna AuditTrail	View Antenna	None
		3.4.3 Display Antenna Deleted Notification	AuditTrail	View Antenna	Notification
	3.5 Add Tag	3.5.1 Display Tag Management Screen	Tag TagStatus	Tag Management	None
		3.5.2 Display Add Tag screen	None	Create Tag	None

		3.5.3 Capture Tag details and check for empty fields	None	Create Tag	None
		3.5.4 Validate Tag details	None	Create Tag	None
		3.5.5 Verify Tag Details	Tag	Create Tag	None
		3.5.6 Generate Tag ID and Save Tag details	Tag	Create Tag	None
		3.5.7 Display Add Tag Successful Notification	AuditTrail	Create Tag	Notification
	3.6 Search Tag	3.6.1 Display Tag management screen	None	Tag Management	None
		3.6.2 Capture Tag Search criteria details	None	Tag Management	None
		3.6.3 Display Searched Tag results	Tag TagStatus	Tag Management	None
		3.6.4 Display Searched Tag Screen	Tag TagStatus AuditTrail	View Tag	None
	3.7 Update Tag	3.7.1 Display Searched Tag Screen	None	View Tag	None
		3.7.2 Capture Updated Tag details and check for empty fields	None	View Tag	None
		3.7.3 Validate updated Tag details	None	View Tag	None
		3.7.4 Save updated Tag details	Tag TagStatus	View Tag	None
		3.7.5 Display Update Successful Notification	AuditTrail	View Tag	Notification
	3.8 Delete Tag	3.8.1 Display Searched Tag Screen	Tag	View Tag	None
		3.8.2 Delete Searched Tag details	Tag	View Tag	None
		3.8.3 Display Tag Deleted successfully notification	AuditTrail	View Tag	Notification
4. Student	4.1 Add Student	4.1.1 Display Student Management Screen	Student	Student Management	None
		4.1.2 Display Add Student Screen	None	Create Student	None
		4.1.3 Capture Student details and check that all fields are filled in and an option selected in Combo box	None	Create Student	None

		4.1.4 Validate Student details	None	Create Student	None
		4.1.5 Verify Student Details	Student	Create Student	None
		4.1.6 Generate Student ID and Save Student details	Student	Create Student	None
		4.1.7 Display Create Successful Notification	AuditTrail	Create Student	Notification
	4.2 Search Student	4.2.1 Display Student management Screen	Student	Student Management	None
		4.2.2 Capture Student Search criteria details	None	Student Management	None
		4.2.3 Display Searched Student Results	Student	Student Management	None
		4.2.4 Display Searched Student Screen	Student AuditTrail	View Student	None
	4.3 Update Student	4.3.1 Display Searched Student details	None	View Student	None
		4.3.2 Capture Student details and check for empty fields and for unselected combo box	None	View Student	None
		4.3.3 Validate updated Student details	None	View Student	None
		4.3.4 Save updated Student details	Student	View Student	None
		4.3.5 Display Update Successful Notification	AuditTrail	View Student	Notification
	4.4 Delete Student	4.4.1 Display Searched Student Screen	None	View Student	None
		4.4.2 Delete Searched Student details	Student	View Student	None
		4.4.3 Display Student Deleted Successfully Notification	AuditTrail	View Student	Notification
	4.5 Capture Student Mark	4.5.1 Display Student Mark management Screen	Student StudentMark	Student Mark Management	None
		4.5.2 Display Capture Student Mark details	Student StudentMark	Capture Student Mark	None
		4.5.3 Capture Student Mark details and check that all fields are filled in and an option selected in Combo box	None	Capture Student Mark	None

		4.5.4 Validate Student Mark details	None	Capture Student Mark	None
		4.5.5 Generate StudentMarkID and Save Student details	StudentMark	Capture Student Mark	None
		4.5.6 Display Capture Mark Successful Notification	AuditTrail	Capture Student Mark	Notification
	4.6 Search Student Marks	4.6.1 Display Student Mark management Screen	Student StudentMark	Student Mark Management	None
		4.6.2 Capture Student Mark Search criteria details	None	Student Mark Management	None
		4.6.3 Display Searched Student Mark Results	Student StudentMark AuditTrail	Student Mark Management	None
	4.7 Add Mark Type	4.7.1 Display Mark Type Management Screen	MarkType	Mark Type Management	None
		4.7.2 Display Add Mark Type Screen	None	Create Mark Type	None
		4.7.3 Captures Mark Type details and check that all fields are filled in	None	Create Mark Type	None
		4.7.4 Validate Mark Type details	None	Create Mark Type	None
		4.7.5 Verify Mark Type Details	MarkType	Create Mark Type	None
		4.7.6 Generate MarkTypeID and Save Mark Type details	MarkType	Create Mark Type	None
		4.7.7 Display Create Mark Type Successful Notification	AuditTrail	Create Mark Type	Notification
	4.8 Search Mark Type	4.8.1 Display Mark Type Management Screen	MarkType	Mark Type Management	None
		4.8.2 Capture Mark Type Search criteria details	None	Mark Type Management	None
		4.8.3 Display Searched Student Results	MarkType	Mark Type Management	None
		4.8.4 Display Searched Mark Type Screen	MarkType AuditTrail	View Mark Type	None
	4.9 Update Mark Type	4.9.1 Display Searched Mark Type Screen	None	View Mark Type	None
		4.9.2 Capture Mark Type details and check for empty fields	None	View Mark Type	None

		4.9.3 Validate updated Mark Type details	MarkType	View Mark Type	None
		4.9.4 Save updated Mark Type details	MarkType	View Mark Type	None
		4.9.5 Display Update Successful Notification	AuditTrail	View Mark Type	Notification
	4.10 Delete Mark Type	4.10.1 Display Searched Mark Type details	None	View Mark Type	None
		4.10.2 Delete Searched Mark Type details	MarkType	View Mark Type	None
		4.10.3 Display Mark Type Deleted Successfully Notification	AuditTrail	View Mark Type	Notification
5. Bicycle	5.1 Add Bicycle	5.1.1 Display Bicycle Management Screen	Bicycle BicycleStatus	Bicycle Management	None
		5.1.2 Display Add Bicycle Screen	None	Create Bicycle	None
		5.1.3 Captured Bicycle details and check that all fields are filled in	None	Create Bicycle	None
		5.1.4 Validate Bicycle details	None	Create Bicycle	None
		5.1.5 Verify Bicycle details	Bicycle	Create Bicycle	None
		5.1.6 Generate BicycleID and Save Bicycle details	Bicycle	Create Bicycle	None
		5.1.7 Display Create Successful Notification	AuditTrail	Create Bicycle	Notification
	5.2 Search Bicycle	5.2.1 Display Bicycle management Screen	Bicycle BicycleStatus	Bicycle Management	None
		5.2.2 Capture Bicycle Search criteria details	None	Bicycle Management	None
		5.2.3 Display Searched Bicycle Results	Bicycle BicycleStatus	Bicycle Management	None
		5.2.4 Display Searched Bicycle Screen	Bicycle BicycleStatus AuditTrail	View Bicycle	None
	5.3 Update Bicycle	5.3.1 Display Searched Bicycle details	None	View Bicycle	None
		5.3.2 Capture Bicycle details and check for empty fields	None	View Bicycle	None
		5.3.3 Validate Updated Bicycle details	None	View Bicycle	None
		5.3.4 Save Updated Bicycle details	Bicycle	View Bicycle	None

		5.3.5 Display Update Successful Notification	AuditTrail	View Bicycle	Notification
	5.4 Delete Bicycle	5.4.1 Display Searched Bicycle details	None	View Bicycle	None
		5.4.2 Delete Searched Bicycle details	Bicycle	View Bicycle	None
		5.4.3 Display Bicycle Deleted successfully notification	AuditTrail	View Bicycle	Notification
	5.5 Assign A Bicycle To Student	5.5.1 Display Bicycle management Screen	Bicycle Student BicycleStatus	Bicycle Management	None
		5.5.2 Display Assign Bicycle to Student Screen	Student BicycleStudent	Assign Bicycle to Student	None
		5.5.3 Capture and Validate Assign Bicycle to student details	None	Assign Bicycle to Student	None
		5.5.4 Update and Save inputted details	Bicycle BicycleStudent	Assign Bicycle to Student	None
		5.5.5 Display Assign Successful Notification	AuditTrail	Assign Bicycle to Student	Notification
	5.6 Unassign Bicycle From Student	5.6.1 Display Bicycle Assignment Screen	Student BicycleStudent	Bicycle Assignment	None
		5.6.2 Update and Save Unassign Bicycle details	Bicycle BicycleStatus BicycleStudent Student	Bicycle Assignment	None
		5.6.3 Display Unassign Successful notification	AuditTrail	Bicycle Assignment	Notification
	5.7 Assign Tag To Bicycle	5.7.1 Display Tag assignment Screen	Bicycle Tag	Tag Assignment	None
		5.7.2 Display Assign Tag to Bicycle Screen	Bicycle Tag	Assign Tag to Bicycle	None
		5.7.3 Capture and Validate Assign Tag to Bicycle details	None	Assign Tag to Bicycle	None
		5.7.4 Update and Save inputted details	Bicycle Tag	Assign Tag to Bicycle	None
		5.7.5 Display Assign Successful Notification	AuditTrail	Assign Tag to Bicycle	Notification
	5.8 Unassign Tag from Bicycle	5.8.1 Display Tag Assignment Screen	None	Tag Assignment	None
		5.8.2 Update and Save Unassign Tag details	Bicycle Tag	Tag Assignment	None

		5.8.3 Display Unassign Successful Notification	AuditTrail	Tag Assignment	Notification
6. Bicycle Part	6.1 Add Bicycle Part	6.1.1 Display Bicycle Part Management Screen	Part Section	Bicycle Part Management	None
		6.1.2 Display Add Bicycle Part Screen	None	Create Bicycle Part	None
		6.1.3 Capture Bicycle Part details and check that all fields are filled in and an option selected in Combo box	None	Create Bicycle Part	None
		6.1.4 Validate Bicycle Part details	None	Create Bicycle Part	None
		6.1.5 Verify Bicycle Part details	Part	Create Bicycle Part	None
		6.1.6 Generate PartID and Save Bicycle Part details	Part	Create Bicycle Part	None
		6.1.7 Display Add Successful Notification	AuditTrail	Create Bicycle Part	Notification
	6.2 Search Bicycle Part	6.2.1 Display Bicycle Part Management Screen	Part Section	Bicycle Part Management	None
		6.2.2 Capture Bicycle Part Search criteria details	None	Bicycle Part Management	None
		6.2.3 Display Searched Bicycle Part Results	Part Section	Bicycle Part Management	None
		6.2.4 Display Searched Bicycle Part Screen	Part Section AuditTrail	View Bicycle Part	None
	6.3 Update Bicycle Part	6.3.1 Display Searched Bicycle Part Screen	None	View Bicycle Part	None
		6.3.2 Capture Bicycle Part details and check for empty fields and for unselected combo box	None	View Bicycle Part	None
		6.3.3 Validate Updated Bicycle Part details	None	View Bicycle Part	None
		6.3.4 Save Updated Bicycle Part details	Part	View Bicycle Part	None
		6.3.5 Display Update Successful Notification	AuditTrail	View Bicycle Part	Notification
	6.4 Delete BicyclePart	6.4.1 Display Searched Bicycle Part details	None	View Bicycle Part	None
		6.4.2 Delete Searched Bicycle Part details	Part	View Bicycle Part	None

		6.4.3 Display Bicycle Part deleted successfully Notification	AuditTrail	View Bicycle Part	Notification
	6.5 Add Bicycle Section	6.5.1 Display Bicycle Section Management Screen	Section	Bicycle Section Management	None
		6.5.2 Display Add Bicycle Section Screen	None	Create Bicycle Section	None
		6.5.3 Capture Bicycle Section details and check that all fields are filled in	None	Create Bicycle Section	None
		6.5.4 Validate Bicycle Section details	None	Create Bicycle Section	None
		6.5.5 Verify Bicycle Section details	Section	Create Bicycle Section	None
		6.5.6 Generate SectionID and Save Bicycle Section details	Section	Create Bicycle Section	None
		6.5.7 Display Add Successful Notification	AuditTrail	Create Bicycle Section	Notification
	6.6 Search Bicycle Section	6.6.1 Display Bicycle Section Management Screen	Section	Bicycle Section Management	None
		6.6.2 Capture Bicycle Section Search criteria details	None	Bicycle Section Management	None
		6.6.3 Display Searched Bicycle Section details	Section	Bicycle Section Management	None
		6.6.4 Display Searched Bicycle Section Screen	BicycleSection	View Bicycle Section	None
	6.7 Update Bicycle Section	6.7.1 Display Searched Bicycle Section Screen	None	View Bicycle Section	None
		6.7.2 Capture Bicycle Section details and check for empty fields	None	View Bicycle Section	None
		6.7.3 Validate Updated Bicycle Section details	None	View Bicycle Section	None
		6.7.4 Save Updated Bicycle Section details	Section	View Bicycle Section	None
		6.7.5 Display Update Successful Notification	AuditTrail	View Bicycle Section	Notification

	6.8 Delete Bicycle Section	6.8.1 Display Searched Bicycle Section details	None	View Bicycle Section	None
		6.8.2 Delete Searched Bicycle Section details	Section	View Bicycle Section	None
		6.8.3 Display Bicycle Section deleted successfully notification	AuditTrail	View Bicycle Section	Notification
7. Tracking	7.1 Add Log Entry	7.1.1 Capture tag details	None	None	None
		7.1.2 [ALT] Tag read error termination	None	None	None
		7.1.2 Create and Save Log entry details	Log AuditTrail	None	None
	7.2 Search Log Entry	7.2.1 Display Log management Screen	None	Log Management	None
		7.2.2 Capture Log entry Search criteria details	None	Log Management	None
		7.2.3 Display Searched Log Entry Screen	Log AuditTrail	Log Management	None
	7.3 Add Route	7.3.1 Display Route Management Screen	Route School	Route Management	None
		7.3.2 Display Add Route Screen	None	Create Route	None
		7.3.3 Capture Route details and check that all fields are filled in and an option selected in Combo box	None	Create Route	None
		7.3.4 Validate Route details	None	Create Route	None
		7.3.5 Verify Route Details	Route	Create Route	None
		7.3.6 Generate RouteID and RouteAntenna and Save the corresponding details	Route RouteAntenna	Create Route	None
		7.3.7 Display Create Successful Notification	AuditTrail	Create Route	Notification
	7.4 Search Route	7.4.1 Display Route management Screen	Route School	Route Management	None
		7.4.2 Capture Route Search criteria details	None	Route Management	None
		7.4.3 Display Searched Route Results	Route School	Route Management	None
		7.4.4 Display Searched Route Screen	Route AuditTrail	View Route	None
	7.5 Update Route	7.5.1 Display Searched Route details	None	View Route	None

		7.5.2 Capture Route details and check for empty fields and for unselected combo box	None	View Route	None
		7.5.3 Validate updated Route details	None	View Route	None
		7.5.4 Save updated Route details	Route RouteAntenna	View Route	None
		7.5.5 Display Update Successful Notification	AuditTrail	View Route	Notification
	7.6 Delete Route	7.6.1 Display Searched Route Screen	None	View Route	None
		7.6.2 Delete Searched Route details	Route RouteAntenna	View Route	None
		7.6.3 Display Route Deleted successfully Notification	AuditTrail	View Route	Notification
8. Job Tasks	8.1 Add Fault Task	8.1.1 Display Fault Task Management Screen	FaultTask	Fault Task Management	None
		8.1.2 Display Add Fault Task Screen	None	Create Fault Task	None
		8.1.3 Capture Fault task details and check for empty fields	None	Create Fault Task	None
		8.1.4 Validate Fault task details	None	Create Fault Task	None
		8.1.5 Verify Fault Task details	FaultTask	Create Fault Task	None
		8.1.6 Generate Fault ID and Save FaultTask details	FaultTask	Create Fault Task	None
		8.1.7 Display Add Successful Notification	AuditTrail	Create Fault Task	Notification
	8.2 Search Fault Task	8.2.1 Display Fault Task Management Screen	FaultTask	Fault Task Management	None
		8.2.2 Capture Fault Task Search criteria details	None	Fault Task Management	None
		8.2.3 Display Searched Fault Task Results	FaultTask	Fault Task Management	None
		8.2.4 Display Fault Task details Screen	FaultTask AuditTrail	View Fault Task	None
	8.3 Update Fault Task	8.3.1 Display Searched Fault Task screen	None	View Fault Task	None
		8.3.2 Capture Fault task details and check for empty fields	None	View Fault Task	None

		8.3.3 Validate Updated Fault Task details	None	View Fault Task	None
		8.3.4 Save updated Fault Task details	FaultTask	View Fault Task	None
		8.3.5 Display Update Successful Notification	AuditTrail	View Fault Task	Notification
	8.4 Delete Fault Task	8.4.1 Display Searched Fault Task screen	None	View Fault Task	None
		8.4.2 Delete Searched Fault Task details	FaultTask	View Fault Task	None
		8.4.3 Display Fault Task deleted successfully Notification	AuditTrail	View Fault Task	Notification
	8.5 Add Maintenance Task	8.5.1 Display Maintenance Task Management Screen	MaintenanceTask	Maintenance Task Management	None
		8.5.2 Display Add Maintenance Task screen	None	Create Maintenance Task	None
		8.5.3 Capture Maintenance Task details and check for empty field	None	Create Maintenance Task	None
		8.5.4 Validate Maintenance task details	None	Create Maintenance Task	None
		8.5.5 Verify Maintenance Task details	MaintenanceTask	Create Maintenance Task	None
		8.5.6 Generate MaintenanceTask ID and Save MaintenanceTask details	MaintenanceTask	Create Maintenance Task	None
		8.5.7 Display Add Successful Notification	AuditTrail	Create Maintenance Task	Notification
	8.6 Search Maintenance Task	8.6.1 Display MaintenanceTask Management Screen	MaintenanceTask MaintenanceType	Maintenance Task Management	None
		8.6.2 Capture Maintenance Task Search criteria details	None	Maintenance Task Management	None
		8.6.3 Display Searched Maintenance Task Results	MaintenanceTask MaintenanceGroup	Maintenance Task Management	None

		8.6.4 Display Maintenance Task Details Screen	MaintenanceTask AuditTrail	View Maintenance Task	None
	8.7 Update Maintenance Task	8.7.1 Display Searched Maintenance Task screen	None	View Maintenance Task	None
		8.7.2 Capture Maintenance task details and check for empty fields	None	View Maintenance Task	None
		8.7.3 Validate Updated Maintenance Task details	None	View Maintenance Task	None
		8.7.4 Save Updated Maintenance Task details	MaintenanceTask	View Maintenance Task	None
		8.7.5 Display Update Successful Notification	AuditTrail	View Maintenance Task	Notification
	8.8 Delete Maintenance Task	8.8.1 Display Searched Maintenance Task screen	None	View Maintenance Task	None
		8.8.2 Delete Searched Maintenance Task details	MaintenanceTask	View Maintenance Task	None
		8.8.3 Display Maintenance Task deleted successfully Notification	AuditTrail	View Maintenance Task	Notification
9. School	9.1 Add School	9.1.1 Display School Management Screen	School	School Management	None
		9.1.2 Display Add School Screen	None	Create School	None
		9.1.3 Capture School details and check that all fields are filled in and an option selected in Combo box	None	Create School	None
		9.1.4 Validate School details	None	Create School	None
		9.1.5 Verify School Details	School	Create School	None
		9.1.6 Generate SchoolID and Save School details	School	Create School	None
		9.1.7 Display Create School Successful Notification	AuditTrail	Create School	Notification

	9.2 Search School	9.2.1 Display School management screen	School	School Management School Management	None
		9.2.2 Capture School Search criteria details	None	School Management	None
		9.2.3 Display Searched School Results	School	School Management	None
		9.2.4 Display Searched School Screen	School AuditTrail	School Management	None
	9.3 Update School	9.3.1 Display Searched School screen	None	View School	None
		9.3.2 Capture School details and check for empty fields and for unselected combo box	None	View School	None
		9.3.3 Validate Updated School details	None	View School	None
		9.3.4 Save updated School details	School	View School	None
		9.3.5 Display Update Successful Notification	AuditTrail	View School	Notification
	9.4 Delete School	9.4.1 Display Searched School screen	None	View School	None
		9.4.2 Delete Searched School details	School	View School	None
		9.4.3 Display School deleted successfully Notification	AuditTrail	View School	Notification
10. Job	10.1 Report Repair Job	10.1.1 Display QR Scan Screen	None	QR Scan	None
		10.1.2 Generate RepairJobID and Save Repair Job details	RepairJob	QR Scan	None
		10.1.3 Display Full Bicycle Blueprint Screen	Section	Bicycle Blueprint	None
		10.1.3 [ALT] Display Unknown Fault Screen	None	Unknown fault	None
		10.1.4 Display Section Blueprint Screen	Part	Section Blueprint	None
		10.1.4 [ALT] Display Unknown Fault Screen	None	Unknown fault	None
		10.1.5 Display Part Faults Screen	FaultType	Part Fault	None
		10.1.5 [ALT] Display Unknown Fault Screen	None	Unknown fault	None

		10.1.6 Generate JobFaultID and Save JobFault details	JobFault	Part Fault	None
		10.1.7 Display Fault List Screen details	FaultType JobFault Part Section	Fault List	None
		10.1.8 Assign Job and Create Check-In entry	Check-In	Fault List	None
		10.1.9 Display Fault Reported Successfully Notification	AuditTrail	Fault List	Notification
	10.2 Complete Job	10.2.1 Save and Update Repair Job details	RepairJob	JobList	None
		10.2.2 Job Completed Successfully Notification	AuditTrail	JobList	Notification
	10.3 Check-In Bicycle	10.3.1 Receive Student Bicycle	None	None	None
		10.3.2 Display QR Scan Screen	None	QR Scan	None
		10.3.3 Capture and Retrieve Check-In details	Bicycle RepairJob MaintenanceJob Check-In	QR Scan	None
		10.3.3A [ALT] Display Bicycle not due error Screen	None	QR Scan	None
		10.3.3B [ALT] Notify Student of unsuccessful check-In	None	QR Scan	Notification
		10.3.4 Update and Save Check-In details	Check-In	QR Scan	None
		10.3.5 Display Check-in Successful Notification	None	QR Scan	Notification
		10.3.6 Notify Student of Successful check-in	AuditTrail	QR Scan	None
	10.4 Report Maintenance	10.4.1 Generate Next Maintenance date details	MaintenanceList MaintenanceJob MaintenanceType	None	None
		10.4.2 Generate MaintenanceListID and Save MaintenanceList details	MaintenanceList MaintenanceJob	None	None
		10.4.3 Update Past Maintenance List Status	MaintenanceList	None	None

		10.4.4 Assign Job to Mechanic	Check-In AuditTrail	None	None
11. Reporting	11.1 Generate Mechanic Schedule	11.1.1 Generate and View Mechanic Schedule	BusinessRule MechanicSchedule Student BicycleStudent MaintenanceTask FaultTask	Mechanic Schedule	Mechanic Schedule Report
		11.1.2 Generate PDF download file	AuditTrail	Mechanic Schedule	Mechanic Schedule PDF
	11.2 Generate Mechanic Schedule Requirements Report	11.2.1 Generate and View Mechanic Schedule	BusinessRule MechanicSchedule Student FaultType BicycleStudent MaintenanceTask FaultTask	Mechanic Schedule	Mechanic Schedule Requirements Report
		11.2.2 Generate PDF download file	AuditTrail	Mechanic Schedule	Mechanic Schedule Requirements PDF
	11.3 Generate Student Report	11.3.1 Display Student report Screen	Mark Type	Student Report	None
		11.3.2 Capture desired criteria and check that a option in combo box is selected	None	Student Report	None
		11.3.3 Generate Chart details	Student BicycleStudent Attendance StudentMark	Student Report	Student report Chart
		11.3.4 Display Chart and Control breaks details	None	Student Report	Student Report
		11.3.5 Generate PDF download file	AuditTrail	Student Report	Student Report PDF
	11.4 Generate Bicycle History Report	11.4.1 Display Bicycle History report Screen	School	Bicycle History Report	None
		11.4.2 Capture desired criteria and check that an option in combo box is selected	None	Bicycle History Report	None

		11.4.3 Generate Report details	Student ScheduledMaintenance RepairJob FaultTask MaintenanceTask MechanicJobStatus	Bicycle History Report	None
		11.4.4 Display Bicycle History Report details	AuditTrail	Bicycle History Report	Bicycle History Report
		11.4.5 Generate PDF download file	AuditTrail	Bicycle History Report	Bicycle History Report PDF
	11.5 Generate Log Report	11.5.1 Display Log report Screen	None	Log Report	None
		11.5.2 Capture desired criteria and check that a Start and end date are selected	None	Log Report	None
		11.5.3 Generate Log Report details	Student Bicycle Tag Log	Log Report	None
		11.5.4 Display Log Report details	None	Log Report	Log Report
		11.5.5 Generate PDF download file	AuditTrail	Log Report	Log Report PDF
	11.6 Generate Parts Used Report	11.6.1 Display Parts Used Report Screen	None	Parts Used Report	None
		11.6.2 Capture desired criteria and check that a Start and end date are selected	None	Parts Used Report	None
		11.6.3 Generate Parts Used Report details	FaultTask MaintenanceTask RepairJob ScheduledMaintenance Student BicycleStudent JobFaultTask MechanicJobStatus	Parts Used Report	None
		11.6.4 Display Parts Used Report details	None	Parts Used Report	Parts Used Report

		11.6.5 Generate PDF download file	AuditTrail	Parts Used Report	Parts Used Report PDF
12. Notification	12.1 Send Student did not arrive notification	12.1.1 Identify a Student who hasn't arrived at school	Log	None	None
		12.1.2 Retrieve Student details	Bicycle Student Guardian	None	None
		12.1.3 Generate and Send Student alert notification email	AuditTrail	None	Alert Email
	12.2 Send Student Check-In notification	12.2.1 Retrieve Bicycle due for Maintenance	Student Bicycle BicycleStudent	None	None
		12.2.2 Generate Maintenance notification details	None	None	None
		12.2.3 Maintenance notification email details	AuditTrail	None	Maintenance notification Email
13. Administrator	13.1 Backup Data	13.1.1 Display System Backup and Restore Screen	BackupFile	System Backup and Restore	None
		13.1.2 Perform system backup	BackupFile	System Backup and Restore	None
		13.1.3 Display Backup successful notification	AuditTrail	System Backup and Restore	Backup File
	13.2 Restore Data	13.2.1 Display System Backup and Restore Screen	BackupFile	System Backup and Restore	None
		13.2.2 Perform System Restore	BackupFile	System Backup and Restore	None
		13.2.3 Display Restore Successful notification	AuditTrail	System Backup and Restore	None
	13.3 View Audit Trail Log	13.3.1 Display Audit Trail Management Screen	None	Audit Trail Management	None
		13.3.2 Display Audit trail Log Screen	AuditTrail	Audit Trail Log	None
	13.4 Search Audit Trail Entry	13.4.1 Display Audit Trail Management Screen	UserType AuditTrail	Audit Trail Management	None
		13.4.2 Capture and validate Audit Trail search criteria	None	Audit Trail Management	None

		13.4.3 Display searched Audit Trail Results	AuditTrail	Audit Trail Management	None
		13.4.3 Display Audit Trail details	UserType AuditTrail	Audit Trail Entry	None

4.3. Conclusion

This table has now painted a clearer picture and explains the system requirements and their usage at the lowest level of the system to detail, together with the related screens and the output produced. This is important because those Processes are the moving parts to what our system is intended to do, and what it displays and generates.

5. CRUD Matrix

5.1. Introduction

The CRUD Matrix is an excellent technique that we use to identify the Tables and Attributes in our Database which are used in any User interaction with our system.

CRUD means 'Create, Read, Update or Delete', and the CRUD Matrix identifies the Tables and attributes involved in any CRUD operation. It helps us identify miracles, black holes and grey holes in our system. The application of this technique to our system is shown below:

5.2. CRUD Matrix

Please refer to the attached CRUD Matrix document.

5.3. Conclusion

The analysis in the CRUD Matrix above, now easily can help us to identify any Tables which are not used, and any Tables which are used heavily, and may therefore be a performance bottleneck. This should assist in future when considering database and system expansion, as well as maintenance.

6. Conversion Plan

6.1. Introduction

This section is to discuss the conversion plan of the VVS system. This will include things such as the implementation and deployment of the system, as well as integration and data migration.

6.2. Background Information

The VVS system is laid out in a Model View Controller format which means that it comprises of 3 different components in order to meet the Client's requirements which are the following:

- The VVS system website: This is arguably the largest part of the system and it is how the users interact with our system. It will be hosted either on **Microsoft azure cloud services** or the client's private servers (depending on what they want).
- The VVS database: This database is currently hosted on **Microsoft azure database services** and it can be accessed either through Azure directly or through **SSMS**. The database may be hosted on the client's server should they wish to do so once we hand our system over to them.
- The VVS API: this is the last component of our system. We will either host this privately with our own ISP or host it on our client's server.

6.3. Purpose of Conversion Plan

The purpose of this VVS Conversion Plan, is to detail how the client will transition to actually being able to use this System on their devices, and all technical requirements needed to set everything up on their side. Training needed, is also outlined under here.

6.4. Type of Conversion Plan

Bikes4ERP currently does not have a system which means that the VVS system will be a **completely new implementation**. This means that if the Client decides to use our system then we will guide them on how to use our system as well as helping them integrate it into the Bikes4ERP project.

6.5. Outline of Conversion Plan

The following is the Conversion Plan of implementing our system. Virtual Visionaries has devised a step-by-step approach to make integration and implementation of our system as easily and hassle free as possible for our Client.

Should they decide to use our system we will be working closely with EPI-USE's technical team to integrate the VVS system with their Bikes4ERP project.

6.5.1. VVS database initialization

The first step the Virtual Visionaries took to PLANNING our system was designing the database structure. We therefore also adopt this same approach when CREATING the system by creating the database first.

In order to do this the Client must create and host their database somewhere. In the case of EPI-USE they will most likely host this database on their own servers but for others who may be interested in our system, they will need another way which is what we will be explaining.

For the VVS demo we are actually using **Microsoft Azure Service** for database hosting as well as **SQL Server management studio** for database control. The reason for this is as follows:

- Hosted in the cloud: by using Microsoft Azure service the client immediately gains access to online functionality, this means that regardless of where the client is, they can always access the database provided they have internet because the database is hosted online.
- No need for hardware: Because the client is paying to host on Microsoft's servers, they do not need to pay any maintenance costs for creation and upkeep of server hardware which is much cheaper for a smaller system like this.
- Scalability: Microsoft Azure offers many flexible packages and pay as you go options which means that expanding or downsizing the database is made extremely easy.
- Security: Microsoft Azure offers state of the art security for the client's data by protecting the databases hosted on their servers.

The next step (should the client decide to use azure) is creating a Microsoft azure account for the business.

Once the account is set up, they can then initialize their database by using either an existing script or creating it through SSMS. This allows for easy creation of the database and SSMS also makes it easier for the client to work with the database rather than trying to work with the database in Azure.

Once the database is set up and it is hosted. The client is ready for the next step.

6.5.2. Accessing the VVS website

Due to the VVS system being hosted online, there is no need for the client to manually install anything except for a web browser and internet connection. Accessing the VVS website will be fairly easy so long as the hardware and software which the client is using has the following:

6.5.2.1. Hardware

Component	Minimum	Recommended
av	1.8 GHz: Dual Core	Intel Core i5 @ 2.7GHz or Higher
RAM	4GB RAM	8GB and higher
Primary storage	1GB available Hard Drive Space	5GB available hard drive space or higher
Graphics	Graphics Device capable of 1024 x 768 or higher resolution	Graphics Device capable of 1024 x 768 or higher resolution
Input Devices	Keyboard Mouse Camera (2MP) RFID scanner	Keyboard Mouse Camera (5MP) BLE Antenna
Output Devices	VGA Display Devices	HDMI Display
Network Interface Controller	Built-In NIC	802.11n compatible NIC

6.5.2.2. Software

- Google Chrome, Firefox, Microsoft edge (any 1 of these will work)
- SQL Server Management Studio (if they need to edit the database)
- Any PDF reader (We recommend Adobe Acrobat DC)
- Windows 7+ Operating System

6.5.2.3. Software requirements for website

HTML 5 and Javascript enabled web browser such as Firefox and Google chrome.

6.5.2.4. Installation

The VVS system does not need to be installed because it is online. Here is what will be required from the different users of the system:

- Administrator: The administrator will need to use their workstation either at work or their own device connected to the internet to log into the system so that they have access to administrator functions.
- Mechanic: The mechanic will access the website through his own personal computer.
- School Administrator: The School Admin will utilize either their personal computer.
- Student: The student will make use of a school-provided device to access the VVS Web portal to log Repair Faults for their Bicycles, for the mechanic to come and carry out repairs on them.

6.5.3. Setting up the VVS website

The Virtual Visionaries will have deployed the website by the time it is handed over to the client. Should Epi-Use wish to host the website on their own servers then they can host everything including the API, database and website on their own local servers.

6.5.4. Initial Data migration and loading

ERP4Bikes current data tracking system is still extremely paper based which means that most of their data is either in spreadsheets or in paper form. This

means that the conversion process from paper based to our system is going to take some time.

Our system is able to work in such a way that the Administrator and School administrator can add data through our website without using a SQL script.

6.5.5. Providing Source Code to technical team

We have currently already added EPI-USE to our Gitlab repository which means that their technical team is able to view all of our source code. Our team will spend roughly 45 hours guiding their technical team around our system so that they understand how our system works as well as the source code.

The Virtual Visionaries will ensure that the EPI-USE technical team is able to thoroughly understand the system so that they can integrate our system into their business and maintain as well as change it if they need be.

6.5.6. Setting up initial Super Administrator profiles

In order for our system to work we will need to set up an initial super administrator so that they can have full access to the system. By adding the Super Administrator, they can now perform all the necessary tasks that are required to set up the rest of the user profiles.

6.5.7. Training Employees on performing business tasks

Once The system has been handed over to EPI-USE we need to train the workforce so that everyone understands the system and can make the most of it.

6.5.7.1. Day One: Employee, Manager and Owner training

This first day involves the training of employees, managers and owners on the basics of the system such as logging in and out as well as installation and basic data information manipulation.

Task	Time (hours)	Instructor
Introduction to VVS system	1	Tapiwarufaro Ndoro
How to install the system	1	Cameron King
Logging into the system	0.5	Byron Donald

Updating Login Credentials	0.5	Gareth Phillips
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6.5.7.2. Day Two: Managerial task training

This second day involves the training of employees, managers and owners on the basics of the system such as logging in and out as well as installation and basic data information manipulation.

Task	Time (hours)	Instructor
Introduction to VVS system	0.5	Hansen Li
Adding, Maintaining and removing employees	1	Cameron King
Updating company rules on our system	0.5	Byron Donald
Generating reports	0.5	Gareth Phillips
Explanation of each report	0.5	Hansen Li
Performs backups and restores	1	Gareth Phillips

6.5.7.3. Day Three: Further Support

The third day will be a Q and A session for any queries that the client has for Virtual Visionaries.

6.5.7.3. Day Four: User Acceptance Testing

This day is reserved for feedback for the employees and suggestions as well as feasibility feedback for the Virtual Visionaries.

6.6. Support

The Virtual Visionaries will be providing 2 forms of support which will be the following:

- Customer Support: This covers a wide variety of tasks but basically, we will be assisting EPI-USE wherever we can in whichever way possible in terms of helping them with how to use the system.

- Technical Support: This refers to assisting EPI-USE's technical team in the maintenance and technical support for our system which can include expansion, feature addition and bug fixes.

6.7. Conclusion

In conclusion the conversion plan allows us to see how to deploy the system to our clients as well as provide training so that the integration and implementation is as seem-less as possible.

7. Project Related Issues

7.1. Introduction

This section of Deliverable 6 contains information relating to issues our group encountered during the course of Deliverable 5, 6 and 7. It has been a very rough set of work to, roughest to-date. But we have made it this far.

7.1.1. Issue 1: COVID-19 Lockdown

Firstly, the lockdown measures implemented by the south African government, though good for us, made working on this set of deliverables very challenging. Because we had been geographically spaced out since Lockdown began, we couldn't meet to work in person early enough. It was only later during the course of the deliverable that our Group Leader, Tapiwarufaro managed to get back to Pretoria from Botswana and could resume working with us in person. But even then, the limited contact time made programming our system quite hard. But we planned through adversity and made it through.

7.1.2. Issue 2: Eskom Load shedding

The situation with load shedding really made it hard to constantly keep producing output, since some of our team members have laptops without functional batteries. This meant that a lot of time that could have gone into critical work time or debugging, got lost. The bright side is that we knew before hand when load shedding was coming and could plan around it.

7.1.3. Issue 3: Using GitLab

Version control using GitLab was a major issue for us since day 1. Dealing with merge conflicts from our individual working branches when merging with master, came along with errors and package incompatibilities, which we had to painstakingly manually nit-pick, till we had a working set of node modules for our Front-End. However, as time went on, we now knew how to navigate the waters, and could deal with issues without losing much time and files of hard work.

7.1.4. Issue 4: Client deadlines and expectations

Since the COVID-19 imposed Lockdown period, we lost quite some time from the total possible time to complete these 3 huge deliverables, as compared to the time that past groups from previous years had. This meant that, reaching the 1-week minimum early submission for review to our client EPI-USE, was not so possible, because the semester was already back on and other modules were also demanding. We ended up being able to negotiate 3 extra days to polish up, but even that was such a stretch and took all of us not sleeping for 3 consecutive nights, just to have what needs to be done, done well.

7.1.5. Issue 5: Programming related issues

Given the chokingly short amount of time we had available to program our system, in comparison to its level of complexity and difficulty, accounting for our present skillset, we struggled a lot as a whole with adapting to the new hardware technologies we had to utilize. Figuring out how to embed them into our system was quite a mission, and with no one to ask for help from readily, the journey got 7 times harder. That is primarily why we felt so scrambled for time, we just could not get to everything when we were struggling. We also struggled with the Azure database that we expected to offer us a decent free trial, but it expired on us and we had to migrate to another database server, which presented us with more unexpected database issues.

7.1.6. Issue 6: Stress and Mental Health Management

As a result, from all the ever increasing and piling up challenges, the stress and anxiety became overwhelming for us. There was very little time in light of the mountain we had to conquer, for us to really take significant time off to breath and regain sanity. We just had to power through the errors, the sleepless nights and juggling other modules as well, with very poor mental states of mind

7.1.7. Issue 7: Distance & Technical Difficulties

Lastly, this issue is more of a summary of the other points about. Working with unfamiliar hardware for our system posed a lot of challenges. Working separate from each other and not being able to meet up often to work together also proved to be very challenging. Additionally, some of our personal computers

also ran into issues as well that were not even directly connected to the programming of our system.

7.2. Conclusion

This section of Deliverable 6 contained information relating to issues our group encountered during the course of Deliverable 5, 6 and 7. We however, fortunately made it this far. Though negatively affected during the process, the sacrifice of our own selves was well worth it.

8. Complexity Matrix

INF370 - Complexity Matrix - 2020				
Topic	Level		Marks	MAX
1. Special GUI	For online applications: Responsive web design		3	42
	For desktop applications: Form design according to design principles (Schneiderman's golden rule on navigation applies here)			
	Appropriate use of grids/tables		3	
	Appropriate use of tabs/links		3	
	Use of graphs in an appropriate business context		4	
	The storage and display of graphical information, like photos with a good business reason		3	
	Working e-mail automatically generated from the database in an appropriate business context		2	
	SMS messages automatically generated from the system in an appropriate business context		2	
	Extensive user-friendly search facility		3	
	At least one use of a tree to display data from the database		3	
	Able to dynamically modify a data tree structure and in doing so adjusting the data in the database		4	
	At least one use of a calendar view of data (not a date/time picker; not a plug-in such as Google calendar)		3	
	Uploading a file into the system with appropriate business reason		3	
	The use of audio/video in an appropriate business context		3	
	At least one use of an administrator configurable timer in an appropriate business context		3	
2. Database access	At least 30 tables used (4 member groups) or 40 tables used (5 member groups)		6	15

	Full referential integrity on all tables		6	
	At least one use of master-detail table relationships (Schneiderman's golden rule on system status applies here)		3	
3. Reports	At least 3 simple list reports in a reporting tool (no control breaks, no graphs, single table)		3	15
	At least 2 transactional report with 2 or more control breaks (with heading and calculated values/totals, multiple tables)		6	
	At least 1 report with adjustable criteria		3	
	At least 1 management report using a graph		3	
4. Flexibility	All data that can change in the future should not be hardcoded but maintained in a sub-module of the system (e.g. Lookup tables)		6	12
	Some business rules are not hardcoded but maintained in a sub-module of the system.		6	
5. Error handling	All system-generated errors are trapped, and consistent, user-friendly error messages are displayed		6	12
	Appropriate data validation on all input fields		6	
6. Help	At least one menu item or other control that opens up a complete help document (HTML, PDF, Help-file)		3	15
	Extensive context-sensitive help. E.g. calling Help on a specific screen/function will automatically open the specific help for that screen/function.		6	
	Search Facility on Help		3	
	Extensive use of hints		3	
7. Security	Logon screen with user ID and password and fixed user profiles		3	13
	Applying two-factor authentication with applicable business reasons.		3	
	Encrypted passwords in database		1	
	Flexible user profiles (i.e. you can dynamically add user profiles that will		6	

	enable/disable access to certain parts of the system)			
8. Audit Trail	An audit trail of all transactions in the system showing at least date, time, user, transaction type, critical data (such as amount and quantity of transaction)		6	9
	Able to search the audit trail on any of the following: date, user, transaction type		3	
9. Deployment	For a desktop application: Fully functional installation disks that take care of application installation requirements (install and uninstall)		3	15
	For an online application: Deployment of application to a publicly accessible web server		3	
	For a mobile application: Deployment to an App Market place (such as the Play Store or the AppStore)		6	
	Deployment of the database to a remote database server		3	
10. Backup and Restore	A backup and restore subsystem exist that backup/restore all data (the system may exit during restore)		3	3
11. Import/Export Data	Able to open Word or Excel and automatically place data in it based on the parameters provided (with a good business reason)		6	9
	XML or JSON: At least 1 XML or JSON file for Importing or Exporting of data (with good business reason)		3	
12. External INPUT device	Simple Link to an external INPUT device using plug-and-play technology, such as a swipe card reader, bar code reader, etc. or a native component such as a QR reader, a GPS component, etc.		3	18
	Loose Link to an external INPUT device using device-specific software. Data or images must seamlessly be stored in the database, but device-specific software is visible to the user. (This could include a digital camera, scanner, voice recording device, thump print reader, etc.)		6	

	Tight Link to an external INPUT device using device-specific software. Data or images must seamlessly be stored in the database, but device-specific software is not visible to the user. (This could include a digital camera, scanner, voice recording device, thump print reader, etc.)		9	
13. External APPLICATION / Services	Integrate an existing web service into your application (with good business reason)		3	9
	A fully functional link to an installed external application system exists and the interface must be shown to work on the external system. Note that this excludes Microsoft Office Applications		6	
14. Multiplatform processing for an appropriate business reason	Appropriate business use of static views on an alternative platform.		3	27
	Appropriate use of dynamic views on an alternative platform (i.e. data is displayed from the system's database)		3	
	Appropriate use of substantial dynamic views on an alternative platform (i.e. both reading and writing data from the system's database)		9	
	Uploading a file through an alternative platform onto the system's database.		3	
	Substantial processing on a third platform (i.e. both reading and writing data from the system's database)		9	
15. Programming Principles	The use of a data layer to facilitate interaction between your database and your business layer		3	12
	The use of an API to facilitate interaction between your business layer and your presentation layer		6	
	Comprehensive use of stored procedures and/or triggers and/or jobs.		3	
16. An innovative addition to the system	Any very advanced innovative addition to the system (e.g. machine learning, AI, blockchain, text mining, IoT, etc.)		9	9
	Maximum Complexity Marks			235
	Our Projects Complexity Marks			166

9. Deliverable Conclusion and Sign-off

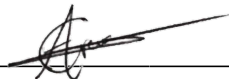
9.1. Deliverable Conclusion

This concludes Deliverable 6 System Documentation, after a thorough reconciliation of our system documentation and revision of previous deliverables, the VVS system has full system documentation done.

9.2. Client Sign-off

I, Anelda Crous, on behalf of EPI-USE, hereby confirm that I understand and agree to the stated scope of work, specifications, diagrams and requirements set out in this document – Visual Visionaries Deliverable 6 System Documentation.

Date: 2020/09/09

Signature: 

9.3. Group Sign-off

We, as Group 17 Visual Visionaries, hereby agree and declare that each member in the group contributed equally and fully to this document, Deliverable 3 and 4 Technical Specification for INF 370 2020.

Name: Cameron King

Signature: 

Date: 2020/09/09

Name: Hansen Li

Signature: 

Date: 2020/09/09

Name: Byron Donald

Signature: 

Date: 2020/09/09

Name: Tapiwarufaro Ndoro

Signature: 

Date: 2020/09/09

Name: Gareth Phillips

Signature: 

Date: 2020/09/09