



# eRhODIS™

## Design Specification

### Overall System and Interface Design

RhODIS® Android Development : eRhODIS™ Application

Version 1.3

This document contains the design specification of the eRhODIS™ application and a detailed description of the system interface and design of the model, views and controls.

# Change History

Date	Version	Description	Updated By
05 August	1.0	Created Document	Gideon
05 August	1.0	Added main sections as discussed.	Gideon
28 October	1.1	Added Amazon EC2 services.	Gideon
30 October	1.1	Added Design mock-ups of ui	Gideon
18 November	1.2	Updated Database Design	Gideon
20 November	1.2	Updated Device Database Design	Gideon
7 February	1.3	Added Protection to databse for public documentation viewing.	Gideon

*\*Changes will be displayed in red throughout the document.*

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# Introduction

RhODIS® (Rhino DNA Index System) is a project that was initiated by the Veterinary Genetics Laboratory of the University of Pretoria in order to help with the plight of the rhinos. The Veterinary Genetics Laboratory is collecting DNA samples of rhinos across the country to create a database using the unique DNA profile of individual rhinos. The goal is for all rhinos to be on the system. This will deter poachers and assist in forensic prosecutions.

RhODIS® was first used in a rhino poaching case in 2010 and resulted in a Vietnamese citizen being sentenced to 10 years imprisonment for having rhinoceros horns from poached rhinos in his baggage when he was apprehended at OR Tambo International Airport. South African National Parks (SANParks) have partnered with RhODIS since 2010 and in association with the Forensics Science Laboratory of the South African Police Services have played a key role in the development and implementation of the RhODIS Kit for sample collection.

The South African Department of Environmental Affairs introduced amendments to the norms and standards for sample collection and identification of live and poached rhinos under the National Environmental Management: Biodiversity Act 10 of 2004 which requires that samples are collected from all poached rhinos and other rhinos that are immobilized or die using RhODIS® kits which then have to be submitted to the Veterinary Genetics Laboratory for inclusion on the RhODIS® database. A number of other bodies including the South African National Parks Honorary Rangers, the World Wildlife Fund, corporates and individuals have donated funds to support the development and implementation of RhODIS®. eRhODIS™ has been developed as an adjunct for RhODIS® to aid in the collection of samples and information relevant to the RhODIS® project and Samsung is the exclusive technology partner associated with this development.

# Purpose

The purpose of this document is to provide a comprehensive overview of the eRhODIS™ application that the Veterinary Genetics Laboratory of the University of Pretoria together with RhODIS® will be developing.

This document will serve as a tool to cater for the end-user, who may use the eRhODIS™ android application. This document will further provide a view from a design perspective, not only in terms of the user interface, but also the inner architecture of the system. This document uses a detailed approach to show how each part of the system as well as the system in its entirety will be implemented.

The intended audience of this document would be any person interested in the design principles behind the eRhODIS™ android application.

# Document Conventions

Conventions used in this document:

Use-Case notation using the Unified Modelling Language (UML).

# Project Scope

The main idea of the application is that it ensures that all information needed to ensure that DNA samples are collected from poached and live rhinos are collected in a standard way and that all the necessary information to provide details of the chain of custody for these samples are automatically collected and uploaded to a secure database for future use should the need arise. All information, including GPS coordinates, photos, sample information is uploaded and stored on the cloud server.

It also ensures that key required data is always collected and uploaded. Use of the application also enhances data accuracy and does away with the need to manually enter any of the data after receipt of the samples in the Laboratory.

The application also uses the S-Pen to capture the authorised person's signature which therefore provides further integrity for the chain of custody features incorporated into the application.

# References

Android developer guidelines <http://developer.android.com/design/index.html>



## Related Documents

eRhODIS™ Requirements Specification.  
eRhODIS™ Architectural Specification.

# System Description

The eRhODIS™ application will serve as a utility tool for end-users to collect samples and relevant data in the field in the event of a rhino poaching or related incident, where after the data will be stored and uploaded to a secure cloud server.

The application ensures that all information needed to ensure that DNA samples are collected from poached and live rhinos are collected in a standard way and that all the necessary information to provide details of the chain of custody for these samples are automatically collected and uploaded to a secure database for future use should the need arise. All information, including GPS coordinates, photos, sample information is uploaded and stored on the cloud server.

It also ensures that key required data is always collected and uploaded. Use of the application also enhances data accuracy and does away with the need to manually enter any of the data after receipt of the samples in the Laboratory.

The application also uses the S-Pen to capture the authorised person's signature which therefore provides further integrity for the chain of custody features incorporated into the application.

User account information are automatically set to a demo account upon the first installation of the application on the device. The specific user's account details are provided and preconfigured by RhODIS® officials and administrators before the device is used by the end user. These account details will also be used by the user to log into the erhodis backed to view their submissions.

The application provides online and off-line capabilities for areas where users have no internet connectivity i.e. cell phone reception or wi-fi coverage.

# Physical View

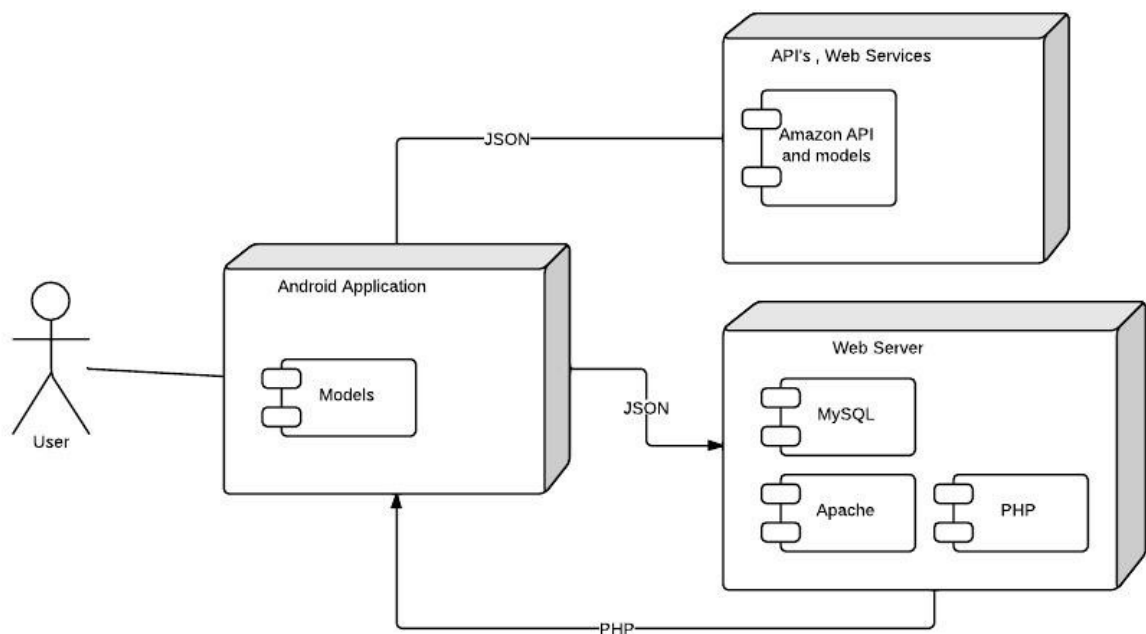
Physically, the system the this android application uses is a N-Tier system between the android application and the MySQL server (hosted on AWS) hosting the database content and providing a means for the android application to communicate with it.

On the android device itself, the android library naturally makes use of the MVC design pattern and provides libraries and built in classes for user code to interact with device facilities such as the GPS or and the camera intent. This is generally referred to as the android service manager.

The models that control the views will be used to interact with device functions and to interact with a MySQL database which stores user data and any data that the user submits.

The model also interacts with other API's and web services that are needed to connect securely to amazon's web services.

In essence, this is the DRY principle and MVC pattern working together.





This is a brief overview of the MySQL database design on the eRhODIS server in the form of an ERD (Entity Relational Diagram).



# Database Design: Android Device

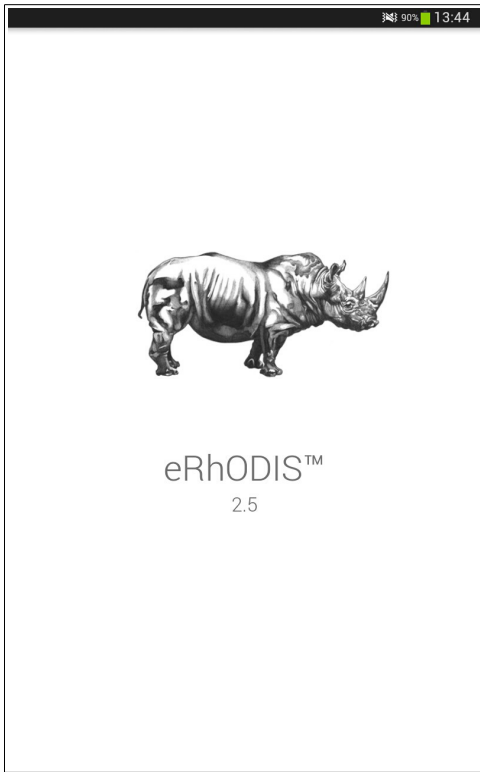
This is a brief overview of the SQLite Database Design on the device in the form of an ERD (Entity Relational Diagram).



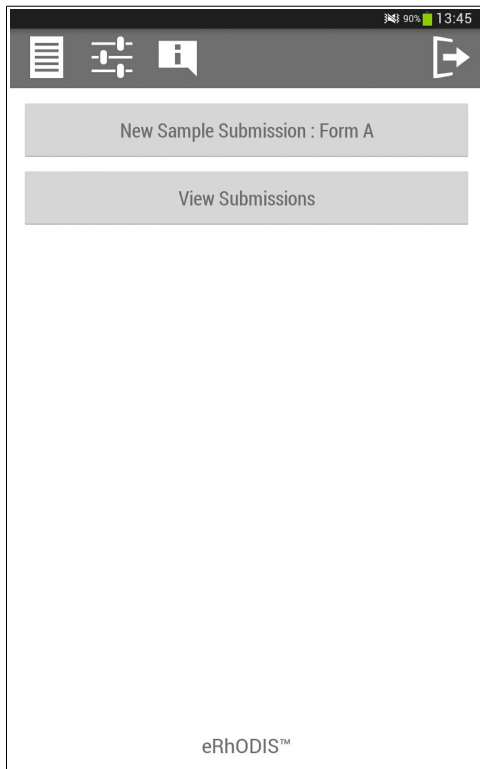
# User Interface

## Example Storyboard Mock-ups

### Splash Screen



## Main Screen



## View Submission Screen



# GPS Screen

90% 13:45

eRhODIS™ Sample Submission : Form A

Get GPS Coordinates

Get GPS Coordinates

Lat: 00.00000 Long: 00.00000

eRhODIS™

# Example of image taken

89% 13:49

eRhODIS™ Sample Submission : Form A

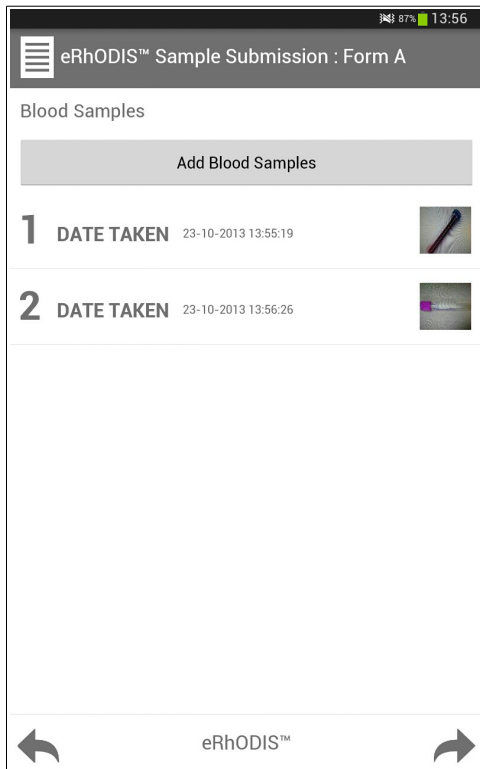
Take a picture of the closed bag.

Take Image of Closed Bag

Take a picture of the closed bag.

eRhODIS™

# Submission of blood samples



The screenshot shows the 'Blood Samples' section of the eRhODIS™ application. At the top, there's a header bar with the title 'eRhODIS™ Sample Submission : Form A' and a status bar showing 87% battery and 13:56. Below the header, the title 'Blood Samples' is followed by a grey button labeled 'Add Blood Samples'. The main content area contains two entries, each with a large number (1 and 2), the label 'DATE TAKEN', a timestamp, and a small image of a blood sample. Entry 1 has a timestamp of '23-10-2013 13:55:19' and entry 2 has '23-10-2013 13:56:26'. At the bottom, there's a navigation bar with left and right arrows and the text 'eRhODIS™'.

87% 13:56

eRhODIS™ Sample Submission : Form A

Blood Samples

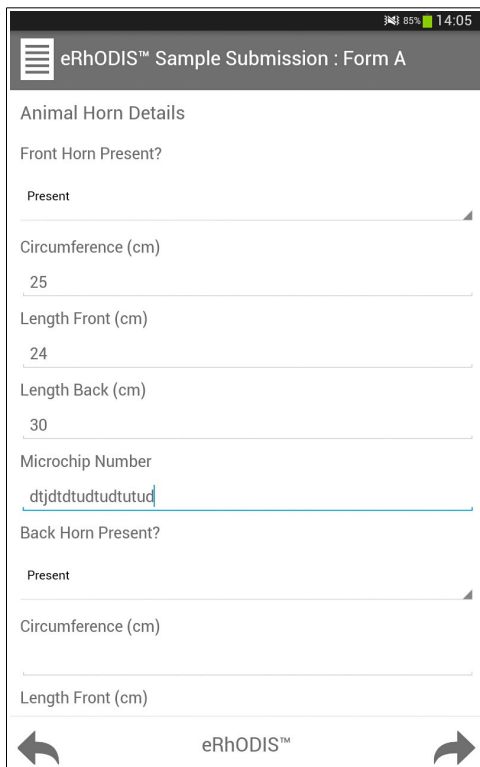
Add Blood Samples

1 DATE TAKEN 23-10-2013 13:55:19

2 DATE TAKEN 23-10-2013 13:56:26

eRhODIS™

# Animal Horn Details



The screenshot shows the 'Animal Horn Details' section of the eRhODIS™ application. At the top, there's a header bar with the title 'eRhODIS™ Sample Submission : Form A' and a status bar showing 85% battery and 14:05. Below the header, the title 'Animal Horn Details' is followed by a form with several fields. The first field is 'Front Horn Present?' with a dropdown menu showing 'Present'. Below this are three text input fields for 'Circumference (cm)' (value: 25), 'Length Front (cm)' (value: 24), and 'Length Back (cm)' (value: 30). The next field is 'Microchip Number' with a text input field containing 'dtjdtutdtutud'. Below this is 'Back Horn Present?' with a dropdown menu showing 'Present'. At the bottom, there are two more text input fields for 'Circumference (cm)' and 'Length Front (cm)'. At the bottom of the screen, there's a navigation bar with left and right arrows and the text 'eRhODIS™'.

85% 14:05

eRhODIS™ Sample Submission : Form A

Animal Horn Details

Front Horn Present?

Present

Circumference (cm)

25

Length Front (cm)

24

Length Back (cm)

30

Microchip Number

dtjdtutdtutud

Back Horn Present?

Present

Circumference (cm)

Length Front (cm)

eRhODIS™

# Area Details

85%14:07

eRhODIS™ Sample Submission : Form A

Area Details

Country

South Africa

South Africa

Spain

Sri Lanka

Sudan

Suriname

Swaziland

Sweden

Switzerland

Syria

Taiwan

# Signature

63%14:13

eRhODIS™ Sample Submission : Form A

Person Collecting Samples Details

Veterinarian Name


Alan Guthrie

Authorized Person Name

Gideon van der Merwe

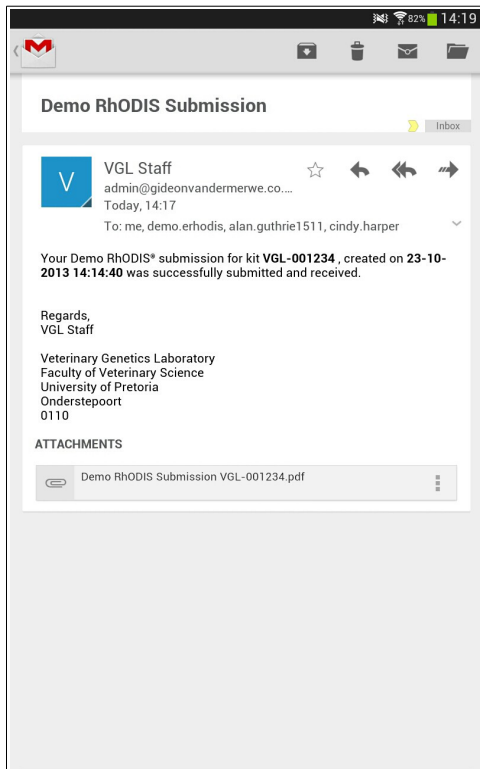
Authorized Person Signature

Signature



eRhODIS™

# Confirmation email with PDF



**Demo RhODIS Submission**

RhODIS Sample Submission  
Form A  
Rhinos animal sample collection  
FORENSIC POACHING

RhODIS Kit Number: VGL-001234  
Date Collected: 23-10-2013 14:14:40  
Police Station: Skukuza  
CAS: [blank]

**Animal Information**

Animal ID / Name	Ear Notches (from front)	Microchip #1 (Body)	Placement 1
R0034a		fflydytdudduud	Placement 2
Age	Adult	Microchip #2 (Body)	Placement 2
Sex	Male	fflydytdudduud	
Species	Black		
Subspecies	Minor (South Africa + Zimbabwe)		

Horn Information (If horns are removed - please complete a separate horn form for each horn and follow the instructions on that form for handling each horn)

Front Horn	Microchip #	Placement	Sample Collected
Present	25	Length Front (cm) 24	Length Back (cm) 20
Back Horn	Microchip #	Placement	Sample Collected
Present	24	Length Front (cm) 54	Length Back (cm) 26

**Sample Information**

Type	Number of each sample type	Other Samples	Ear Tag No
Blood	2		
Hair	1		
Tissue	1		RED215
Horn	1		

Outer Bag Kit Number: VGL-001234  
Inner Bag Kit Number: VGL-011234

**Owner Information**

Owner	Farm	Tel Number	Cell Number	Email
Sanparks	KNP	0123456789	0123456789	jersonabc@knp.co.za

**Area Information**

Area/Town	Province	Country	Lat (S)	Long (E)
Skukuza	Mpumalanga	South Africa	25.65037	28.18133

**Veterinarian Name**  
Alan Guthrie

**Authorized Person**  
Name: Gideon van der Merwe  
Signature:   
Sign Date: 23-10-2013 14:13:25

**Additional Information**  
There were strong winds blowing at 55 knots to the South East.



**Demo RhODIS Submission**

Sample Details	Sample Image
<p>Sample #: 3</p> <p>Kit #: VGL-001234</p> <p>Date Taken: 23-10-2013 14:00:44</p> <p>Type: tissue</p> <p>Description: tissue</p>	
<p>Sample #: 4</p> <p>Kit #: VGL-001234</p> <p>Date Taken: 23-10-2013 14:01:49</p> <p>Type: horn</p> <p>Description: horn</p>	
<p>Sample #: 5</p> <p>Kit #: VGL-001234</p> <p>Date Taken: 23-10-2013 14:02:44</p> <p>Type: other</p> <p>Description: Bone</p>	



## Examples of the web server back end

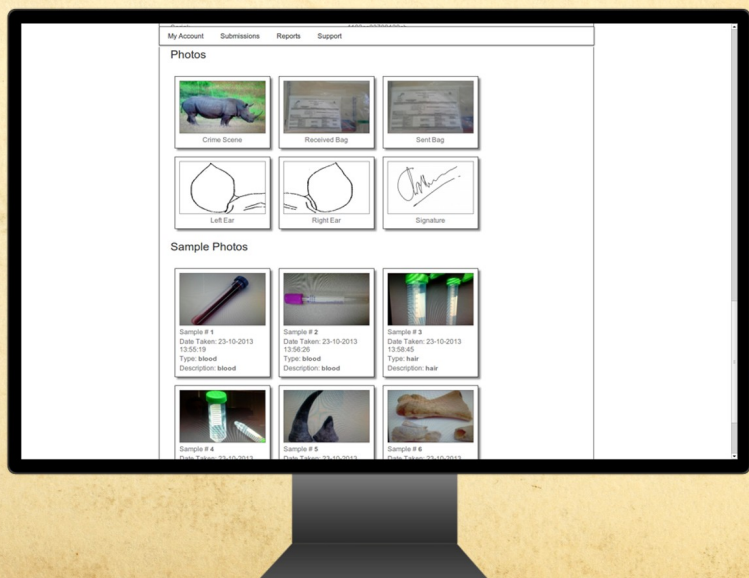
### eRhODIS™

- *List of Submissions.*



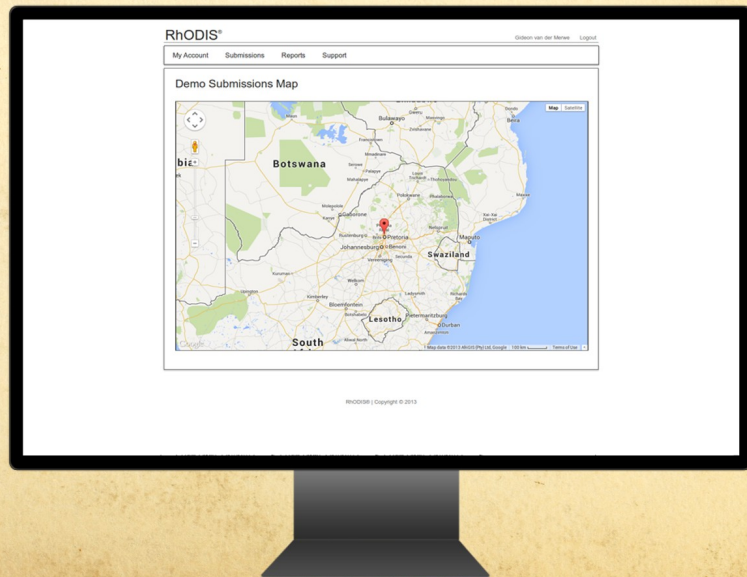
### eRhODIS™

- *View / Edit Submission.*
- *View GPS & location info.*
- *View Photos.*



# eRhODIS™

- *Interactive  
GPS  
functionality.*



# eRhODIS™

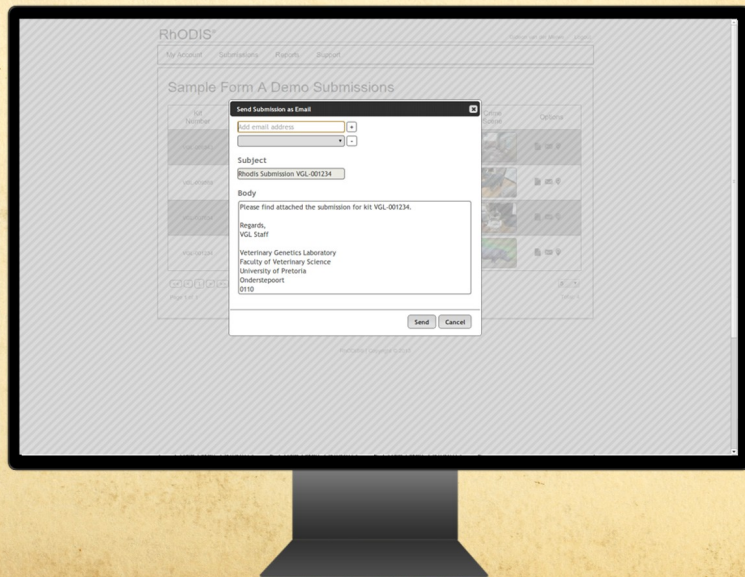
- *Interactive  
GPS  
functionality.*





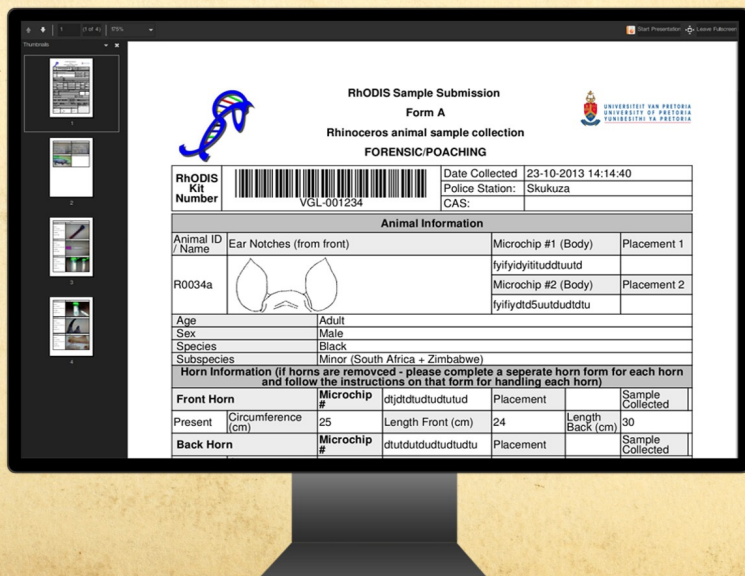
# eRhODIS™

- *E-mail a submission.*



# eRhODIS™

- *Export to PDF.*



# Glossary

Term	Meaning
AWS	Amazon Web Services
Cloud Server	A Server that is maintained within a cloud computing infrastructure.
Cloud Computing	Computing concepts that involve a large number of computers connected through a real-time communication networks such as the Internet.
Database	A database is an organized collection of data.
DBMS	Database Management System
eRhODIS™	Electronic RhODIS®
GPS	Global Positioning System
MVS	Model View Control
RhODIS®	Rhino DNA Indexing System
PDF	Portable Document Format
Server	A computer system that runs one or multiple servers to provide services over a network and deliver content on demand.
Web Server	A Server providing web services such as retrieving web pages and/or data from a database.
UML	Unified Modelling Language