

Terms of Reference for
LEAD DEVELOPER
for the African and Asian Elephant Database

April 20, 2009

These Terms of Reference are accompanied by a detailed Functional Specification

1 Background

The African Elephant Database (AED) is a spatial database used to store, manage, analyze and disseminate information on the distribution and abundance of elephant populations across the African continent. In order to provide a current and accurate picture of the status of African elephants, the database is regularly updated, and African Elephant Status Reports (AESR) are produced and published periodically (1995, 1998, 2002, and 2007).

The AED was initiated in 1986. The objective of the project was to develop a comprehensive picture of elephant numbers and distribution throughout Africa. Using data ranging from systematic survey results to guesses collected in questionnaires and interviews, a database of elephant population estimates and distribution was assembled (Burrill & Douglas-Hamilton, 1987) using a Geographical Information System (GIS). Initially housed at the United Nations Environment Programme (UNEP) headquarters in Nairobi, Kenya, the AED was from its inception until April 1998 a collaborative effort of the Global Environment Monitoring System (GEMS), the Global Resource Information Database (GRID) of UNEP and the IUCN/SSC African Elephant Specialist Group (AfESG).

Towards the end of 1992, the AED became the direct responsibility of the AfESG (<http://www.african-elephant.org>). In April 1998, the AED was moved from UNEP to its present location in the AfESG offices in Nairobi and since 1992, the structure and management of the AED has been overseen by a group of technical experts - the AfESG Data Review Working Group (DRWG). The DRWG meets periodically to review and discuss technical aspects of the AED, oversees the selection and categorization of data to be included in the AED, agrees on new features and analyses to be implemented in the AED and reviews the technical content of the AESR. Decisions made by the DRWG have in the past been implemented by a full-time database manager. Currently, there is no full-time database manager for the AED, due to funding restrictions. A volunteer member of the AfESG maintains the database in hibernation and collects new data when it is available.

The AED is a unique resource that can accommodate and systematically categorize data of varying reliability, thus facilitating interpretation of complex information. It is regularly disseminated to all relevant policy- and decision-making agencies and organizations through the AESR.

Based on the success of the AED, the AfESG – in collaboration with other IUCN Specialist Groups – is planning to expand the scope of the AED to accommodate other species of megafauna for which relatively good population data are available. This multi-species database will require expanding the AED design to accommodate data for additional species and porting the spatial database from MS Access to a multiuser database hosted on a remote server with a PostGIS-enabled PostgreSQL database backend. Some thought has already been put into the development of the multi-species database, and an open source development project has been

initiated in pgFoundry (see Background material below), where documentation and schematics are available.

Initially, the database will hold both AED data and Asian elephant data collected through the Asian Elephant Specialist Group (AsESG). The first phase of the multi-species database will be the African and Asian Elephant Database (AAED).

2 Description of the Assignment

2.1 Objectives of the Assignment

The objective of the assignment is to establish the African and Asian Elephant Database (AAED) based on the AED, to hold data and replicate the AED functionality for other species, with the African and Asian elephants as a priority. The database should be established as per the detailed Functional Specification.

2.2 Scope of the Assignment

The assignment will include the design, development and implementation of the AAED and migration of existing data from the AED, and Asian elephant data as available. The Lead Developer will do the bulk of the work, but will be assisted by a team of volunteer developers. The project will be established as an open source software project, and it will be the responsibility of the Lead Developer to engage and coordinate the volunteer developers.

2.3 Background Material

- African Elephant Database Website: <http://www.african-elephant.org/aed/>
- Wildlife Monitoring Database project: <http://wilddb.projects.postgresql.org/>

2.4 Expected Results

The results to be delivered by the Lead Developer are:

1. A database development plan within 6 weeks of signing the contract;
2. A locally hosted prototype of the database developed within 4 months;
3. A working AAED established within 6 months;
4. Documentation and web-based training material for the maintenance and update of the database produced;
5. All source project code hosted in a version control system such as CVS or Subversion, and available under an open source licence under the copyright of the AfESG;
6. Implementation of a working bug-tracking system using an open source system such as bugzilla;
7. Relevant staff and SG members trained on the maintenance and update of the AAED; and
8. Monthly reports and a final report at the end of the assignment outlining recommendations on:
 - Continuation/improvements
 - Marketing the AAED to encourage other parties to use the multi-species database framework.

2.5 Tasks

The Lead Developer will complete the following tasks:

1. Review and validate the requirements prepared by the AfESG Secretariat;
2. Identify appropriate spatial RDBMS, map/feature servers and GIS clients to be employed, finding a balance between the use of free and open source software (FOSS) and ease of use;
3. Develop the database schema based on the current AED;

4. Develop and implement SQL queries, triggers and stored procedures as needed for the update, management and administration of the AAED, including standard functions and algorithms currently implemented in the AED;
5. Define the range of reports and map layouts to be produced from the database, based on existing reports as currently implemented in the AED;
6. Design an appropriate database structure to support the AAED;
7. Migrate any data from the existing AED, as well as any Asian elephant data available, as guided;
8. Set up a prototype database and review the prototype with stakeholders to get feedback and ensure satisfaction with the end result;
9. Prepare all the necessary documentation for the maintenance and update of the site and undertake training of AfESG staff and the African and Asian elephant Data Review Working Group (DRWG) members;
10. Install the database on a web server, the specifications of which shall be approved by the DRWG;
11. Undertake quality assurance and testing of the database together with the AfESG and African and Asian elephant DRWGs;
12. Define required organization and process design in terms of:
 - Database management and administration
 - Data update
 - Data Quality Control
 - Staff allocation

3 Location and Duration of the Assignment

The assignment may be undertaken at the consultant's own domicile, but travel to Nairobi, Kenya will be required for meetings, training and hand-over. The assignment is expected to be completed within six (6) months.

3.1 Planning and Deadlines

The following is an indicative time schedule for carrying out the assignment:

Week 1

- Preparation

Week 2 – Week 6

- Travel to AfESG Secretariat
- Soliciting and refinement of user requirements
- Online meetings & interviews with key Stakeholders
- **Deliverables: Detailed Database Development Plan and Full Functional Specification**

Week 7 – Week 17

- Development
- Soliciting comments, as needed from AfESG and AsESG
- **Deliverable: Locally-hosted prototype**

Week 18 – Week 21

- Testing
- Soliciting comments from AfESG and AsESG

Week 22 – Week 23

- Implementation
- **Deliverable: Fully functional AAED**

Week 24

- Training
- **Deliverable: Documentation and web-based training material**

Week 25

- Technical acceptance
- Hand-over
- **Deliverable: final report and recommendations**

4 Profile of the Lead Developer

The Lead Developer will meet the following minimum requirements:

4.1 Qualifications

University degree in Computer Science and/or equivalent certification or experience in the development of spatial databases using Postgres.

4.2 Experience

- At least 3-5 years hands-on experience in relational database design and development;
- Extensive experience in GIS and spatial database development, including ArcGIS, ArcInfo, GRASS and PostgreSQL/PostGIS;
- Experience in managing open source software development projects;
- Experience in version control systems such as CVS and subversion;
- Experience in OSS tools and environments: Linux, Eclipse, etc;
- Experience in web server security management – including access control and SSH;
- Proven technical proficiency on emerging GIS, OSS and database trends, technology, and tools.

4.3 Skills/Competencies

- Ability to translate stakeholders' needs into creative, efficient and informative web design in a timely manner. Evidence of spatial databases developed should be provided.
- Advanced spatial database development skills using tools including:
 1. Languages: Perl, Python, xml, php, PL/SQL, C and Visual Basic
 2. Database: postgresql, postgis, oracle, MSSQL server, mysql and MS Access
 3. GIS: ArcGIS, PostGIS, QuantumGIS, ArcSDE, ArcGIS server and OGC Simple Features Specification

4.4 Language

The Lead Developer will have an excellent command of English with good report writing skills. Knowledge of French will be an added advantage.

5 Reporting

The Lead Developer will work under the supervision of the African and Asian Elephant DRWGs through the AfESG's Programme Officer. A steering committee will be set up to guide the Lead Developer.

6 Administrative Information

6.1 Ownership of the work

All work produced under this assignment, including database schemata, data and source code will remain the copyright and intellectual property of the AfESG. The code will be released under an open source licence – such as BSD or the Apache Public Licence.

6.2 Contracting

The Consultant will be hired on an individual contract with IUCN. The contract will cover remuneration and travel expenses. The contract will be elaborated in accordance with these terms of reference. The consultant will invoice IUCN through the AfESG and payment will be undertaken as follows: 40% on signing and 60% once the final report and database has been approved by the AfESG and AsESG.

6.3 Logistics

The Consultant must provide his/her own laptop and additional tools for fulfilment of the assignment. Working space with phone/fax and internet access will be provided, as and when required, to the consultant at the AfESG Secretariat in Nairobi, Kenya.

7 How to Apply

Interested applicants (individuals or companies) should send CV or company portfolio as well as a proposal by email by **Friday 1st May, 2009** to:

Diane Skinner, Programme Officer
IUCN/SSC African Elephant Specialist Group
Email: diane.skinner@iucn.org