SAHRIS: South Africa's integrated, web-based heritage management system

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Abstract

Purpose – The purpose of this paper is to introduce the South African Heritage Resources Information System (SAHRIS), developed by the South African Heritage Resources Agency (SAHRA) in 2011. The paper aims to describe how SAHRIS facilitates online applications for heritage approval and/or permits for developments and research, fulfils SAHRA's mandate as a repository for a national inventory of heritage sites and objects in the country, and serves as an integrated, responsive tool for reporting heritage crimes and tracking the progress of the resultant cases. The paper also aims to explain, simply, the application processes for each of these functions.

Design/methodology/approach – The paper provides an explanation of the design and functions of the system and outlines how each of the content types and applications are created.

Findings – The system has improved the process of South African heritage resources management by decreasing the turnaround time for submissions to heritage authorities, raised the standards of good governance and increased public compliance with the heritage legislation.

Practical implications – Poor uptake of the system by provincial heritage authorities has limited the impact of the system on heritage management as practiced in South Africa.

Social implications – The system, when used effectively provides an efficient service to the public, while promoting good governance, transparency, public access to information and improved compliance with the heritage legislation.

Originality/value – Through the creation of a single, unified platform for heritage management processes, geo-referencing of heritage sites and development areas, the provision of a national fossil sensitivity map, and the national heritage inventory, SAHRIS represents a world first in terms of proactive, integrated heritage management tools.

Keywords GIS, Digital inventory, Heritage crime, Heritage resources management

Paper type Case study

1. Introduction

The South African Heritage Resources Agency (SAHRA) is a statutory body established in terms of the National Heritage Resources Act (NHRA), No. 25 of 1999 (Department of Arts and Culture (DAC), 1999). The NHRA mandates that SAHRA is responsible for the identification and management of the national estate of the country, as well as the co-ordination of the management of heritage resources at provincial and local level. In order to achieve this mandate, Section 39 of the NHRA stipulates that a record of all conservation-worthy heritage resources is to be maintained in the form of a database, which is to be publicly accessible and populated in the format prescribed by SAHRA. Several years of research determined that the best way to achieve this was through the development of an online, integrated heritage management system, designed using free open source software (FOSS).

In the mid-2000s, the groundwork for South African Heritage Resources Information System (SAHRIS) (formerly known as NHRIS or National Heritage Resources Information System) went through exhaustive public participation, and data coding standards were drawn up (South African Heritage Resources Agency (SAHRA), 2005a, 2006, 2007). Full development of SAHRIS, did not materialise at the time due to the exorbitant development costs. The practical development of SAHRIS became possible in 2011 as low cost, highly sophisticated software became more freely available. A project manager and developer were hired in-house to develop SAHRIS in 2012.

SAHRIS was developed using Drupal which has one of the largest communities of developers and users worldwide. This software allows for an integrated geographical information system (GIS) and various other key components of the system. Version 1 of SAHRIS was developed in just over three months, from the end of January to April 2012, and the first live data were entered by SAHRA's staff in May 2012.

In the process of developing SAHRIS, it became necessary to choose a suitable licensing system for the content to ensure that it was disseminated legally and as openly as possible. In South Africa, the legislation contained in the Promotion of Access to Information Act (PAIA), No. 2 of 2000 (Department of Justice and Constitutional Development (DOJCD), South Africa, 2000) and Section 31 of the National Environmental Management Act (NEMA), No. 107 of 1998 (Department of Environmental Affairs (DEA), South Africa, 1998) require that the public has access to the bulk of the types of records held at SAHRA. SAHRA also chose to license all of the media content on SAHRIS using a "share and share alike" license called the creative commons share alike (CCBYSA) license. This license allows users to freely share information they find on SAHRIS, provided that they cite the author, do not sell the data, and, in turn, license their works derived from content on SAHRIS in terms of CCBYSA.

2. What is SAHRIS?
SAHRIS is, primarily, a digital heritage management system which integrates the processes of recording moveable (objects) and immoveable (sites) heritage resources with their management, as mandated by the NHRA.

SAHRIS has four main functions: it serves as an integrated heritage management system, a national sites repository, a national collections repository and a centralised platform for reporting and tracking heritage crime.

2.1 An integrated heritage management system
In March 2013, SAHRA moved from accepting paper-based or e-mailed submissions for development applications to processing these online via SAHRIS. The process is entirely conducted online, from the initial submission by the applicant, through to the deliberations and final comments or decisions by the heritage authority. All related documentation is uploaded to the system, capturing environmental impact assessment reports, environmental management plans, environmental authorisations and relevant heritage reports. The development footprint is captured on SAHRIS' built in GIS tools.

SAHRIS simplifies the public participation process required in various sections of the NHRA. Any member of the public can register a free account and can post their comments about applications within minutes of registration. The various committees serving the heritage authorities also use the online commenting system so that decisions can be reached without the need to convene a physical meeting. This greatly

improves the speed with which applications can be decided and facilitates free, transparent access to the planning process.

By the end of December 2015, a total of 8,020 heritage cases had been processed on the system, with 9,462 heritage reports captured.

2.2 A national heritage sites repository

The SAHRIS sites repository is populated in several ways. SAHRIS restored the national repository for archaeological surveys which was disbanded in 1962 (Deacon, 1993), and archaeological site records from several major South African museum and university research archives have been imported. Sites identified during surveys for developments can also be captured and supplemented with summaries of the impact assessor's site recordings. This feature holds great potential for research by eliminating the traditional separation between commercial and research surveys. By the end of December 2015, a sum of 42,456 sites had been captured to the system.

SAHRIS also includes tools for creating survey layers that record the track paths and areas covered during surveys. These tracks are enclosed in polygons and can be used to establish site densities and for predictive modelling of un-surveyed areas. The world's first fossil sensitivity map was launched on SAHRIS in 2013. The map is based on geological formations which were made available by the Council for Geoscience, and fossil sensitivity reports compiled by palaeontologists. The fossil sensitivity map assists developers, heritage officers and practitioners in screening palaeontologically sensitive areas at the earliest stage of the development cycle.

2.3 A national collections management system

The third core component of SAHRIS is the collections management system. SAHRIS allows South African museums to start small or large scale digital inventories of their collections, with functions to import and host the information free of charge. Several repositories have already provided SAHRA with their digital inventories, while the organisation initiates annual inventorising projects to augment these lists. Objects are also created on the system as part of the process for acquiring export permits either for artworks being moved or sold overseas, or for archaeological or palaeontological research at international institutions.

All images available on SAHRIS are served online at a resolution of 800×600 pixels while the authors are able to download the full resolution versions of images they uploaded to the system. The Robert Chenhall classification system provides the base from which to start the national object taxonomies, and various experts are being consulted to manage and add new terms to the SAHRIS taxonomies.

For heritage managers working directly with heritage objects, the permitting system is integrated with the objects records so that legal exports and conservation treatments can be tracked. SAHRIS also provides audit trails of the movements of objects such as transfers, accessions, loans and de-accessions. Objects that are specially declared as national heritage objects can be processed as such via SAHRIS.

Each institution using SAHRIS is assigned to an "Organic Group (OG)" which manages its own access rights in a self-service schema. Locations of objects within museums and the tracking of movements within and between institutions are automatically set to a secure, private mode, while the object descriptions, histories and photographic material are made public unless exceptional circumstances require that these records be hidden from public view.

By the end of December 2015, a total of 26,195 objects had been captured to the system.

2.4 Centralised heritage crime database

SAHRIS is also an integrated heritage crime database. Heritage crime has been on the rise in South Africa (Benson, 2013), and globalisation has made it simpler to trade in heritage objects sourced from around the world (Ramskjær, 2011; Brodie *et al.*, 2000).

A uniquely South African problem, however, is that the investigation of heritage crimes falls under the purview of the South African Police Services' (SAPS) Endangered Species Protection Unit (ESU), which is also mandated with combating South Africa's rampant rhinoceros poaching (Benson, 2013), negatively impacting the resources available to the processing of heritage crimes.

The fight against heritage crime is guided by numerous international conventions, which are central to formulating policy amongst their various signatories[1]. The terms of these conventions are binding for all signatories, and assist those countries to direct their own heritage management legislation.

SAHRA's mandate to fight heritage crime in South Africa is enshrined in the NHRA, and the organisation has long been identified as a key role player in the fight against heritage crime (Memela, 2008).

Repositories affected by heritage crime in South Africa tend to be reactive and defensive in responding to these incidences, with some closing temporarily in the wake of such incidences (see South African Press Association (SAPA), 2012; Associated Press, 2012), and others removing the remaining vulnerable or valuable heritage objects from display (e.g. Hollands, 2014). While these reactions do serve to protect those heritage objects which are moved to secure storage, or simply no longer available for viewing, negatively affect the institutions as these heritage objects are often those that generate the most visitor interest and revenue.

Locally, the problems in responding to and curbing heritage crime can be identified variously as underreporting, inadequate policing, the low priority of heritage crime in a country that suffers high violent crime rates, lack of public awareness of heritage and under resourcing of museums that have poor security and insufficient, undertrained staff (Benson, 2011).

While these issues exist, to varying degrees around the world (Grove, 2013; Dobovšek and Slak, 2011), a shared problem plagues the effective containment of heritage crime internationally: the general lack of centralised heritage databases that serve as digital repositories as well as platforms for cooperation and synchronisation of the role players and stakeholders in fighting heritage crime (Harrison, 2013; Historic England, 2015; INTERPOL, 2015). While the need for this is recognised by all involved in the fight against heritage crime, there seem to have been no steps taken to address this gap.

Benson (2013) discusses the prevalence of heritage crime in Gauteng, South Africa and proposes initiatives that will address the gaps she identifies. Benson (2013) recommends the establishment of a South African database of stolen heritage objects, which correlates with the INTERPOL stolen works of art database and can be cross-checked for compliance with the Second-Hand Goods Act, No. 6 of 2009 (Republic of South Africa, 2009). Benson (2013) further calls for the development of a central repository, which collates heritage crime data for analysis to detect crime trends and notify role players of these. Benson's (2013) final suggestion is the establishment of a network for the case investigators, comprising insurance underwriters, museum and gallery security managers and relevant specialists in the field.

The creation and maintenance of comprehensive, up to date digital inventories, with descriptions and photographs of the objects, is critical in the fight against heritage crime (Association of Chief Police Officers (ACPO), 2013; Korsell *et al.*, 2006;

ICMS/ICOM, 1993). Such inventories allow repositories to keep precise records of their holdings and thereby establish more quickly that items have been stolen or lost. They also ensure the positive identification of the objects should they be recovered, and stand as proof of ownership of the objects (Benson, 2013), which can lead to more successful prosecutions, and thereby serve as a deterrent to criminals.

SAHRIS fulfils this role, by capturing critical details about instances of heritage crimes. The system links these reported crimes to all relevant role players involved in each step of the process, from opening of the case, investigation of the case to convicting the perpetrator. The role players include the government agencies and heritage authorities, museum professionals, heritage practitioners, art dealers and law enforcement officials, both locally and internationally, customs officials and the public. The system collates all this information in a single, integrated database that is easy to use and that can generate data about heritage crimes for reproduction and comparative analysis in South Africa.

Any heritage object already recorded, described and photographed on SAHRIS stands a far greater chance, should it be stolen, of being located, positively identified and restored to its owner. The network generated by SAHRIS of stakeholders involved in the reporting, investigating and prosecution of the case, as well as the general public, will keep channels of communication between these parties open. This will encourage effective communication between the various groups, which in turn will lead to more positive outcomes for heritage crime cases.

By linking all role players engaged in the process of recording, investigating and ultimately prosecuting heritage crimes, SAHRIS fulfils the functions highlighted as necessary by both local and international members of the heritage community to address the issue of heritage crime. Ultimately, the capacity of SAHRIS to aggregate statistics and location information and create reports on that data will allow the system to increase intelligence on the perpetration of heritage crimes, where the crimes occur, their increase or decrease through time, the percentage that are resolved and the outcomes of prosecutions.

By the end of December 2015, there were 260 stolen objects described on SAHRIS.

3. Creating applications on SAHRIS
3.1 Applications on SAHRIS
The purpose of the NHRA is to protect those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations because they are considered part of the national estate and fall within the sphere of operations of the heritage resources authorities. SAHRA achieves this through the various processes that facilitate heritage resources management in the country (South African Heritage Resources Agency (SAHRA), 2015).

SAHRIS makes it easy for applicants and heritage authorities to interact through the submission of applications via a four-page online wizard that allows users to fill out all relevant details about their project through a quick, easily followed process.

The type of application is specified, i.e. a permit for site management or export of heritage objects; applications for developments or mining rights; reporting heritage crimes, and nominations, declarations and provisional protection of heritage sites. This allows the case to be channelled to the correct branch of the appropriate heritage authority.

The coordinates of sites created on SAHRIS are mapped using the system's built in GIS functionality, as are the locations of heritage objects within repositories such as

museums and galleries. The sites and objects are protected by setting their viewing rights to private, making them visible only to those that have the authority do so, through the creation of OG (Figure 1).

Once the sites or objects have been created, they can be attached to the permit application related to them. The system performs auto searches of existing content and will populate the site or object field in the wizard as the applicant types the name in.

3.2 Development and mining applications

Development and mining applications are governed by Section 38 of the NHRA, and the bulk of this work is generated by Section 38(8), which pertains to applications made in terms of broader legislation, such as environmental or mining law, that have possible implications for heritage resources (Figure 2).

In terms of this section, and in order to ensure the protection of heritage resources, heritage authority input is required as part of the environmental impact assessment process of the NEMA for certain types of development and mining applications. This legislation requires that consideration is made of potential impacts to heritage resources prior to the environmental or mining state authorities issuing approval of applications for development or mining permits. The deciding authority, for instance the Department of Environmental Affairs (DEA) is linked to the case through the DEA case officer and unique reference number.

SAHRIS allows for these composite environmental impact assessment documents and reports to be appended to the applications, thus allowing applicants to submit all the relevant and required information to a single platform. This enables the heritage authority to make an informed decision in a short space of time, based on a comprehensive body of evidence related to all aspects of the application in addition to the heritage component. These documents include but are not limited to background information documents, basic assessment reports, scoping assessments, environmental impact assessments and environmental management plans. These are submitted in addition to the heritage reports, which include palaeontological impact assessments, archaeological impact assessments and heritage impact assessments. Significantly, SAHRIS' built in GIS allows for these applications to be mapped as polygons, creating composite development maps for the country.

3.3 Permit applications

Section 35(4) of the NHRA (DAC, 1999) states that a permit is required to destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or material, or any meteorite, or to trade in such material. Anyone found guilty of an offence in terms of the act is liable for a fine or imprisonment, or both. In cases where material is accidentally disturbed by mining, engineering or agricultural activities, the finds must be reported to a cultural institution such as a museum or university department, or SAHRA.

Permits are generally issued for: the export of material; research excavation; mitigation excavation that form part of development applications, in terms of Section 38 of the NHRA; and for the filming of (or at) archaeological and palaeontological sites (Figure 3).

Once an applicant has filled in the online application and attached all the necessary documents, they change the case status from "Draft" to "Submitted" to indicate that the application is complete and ready for assessment by a heritage officer, who will then
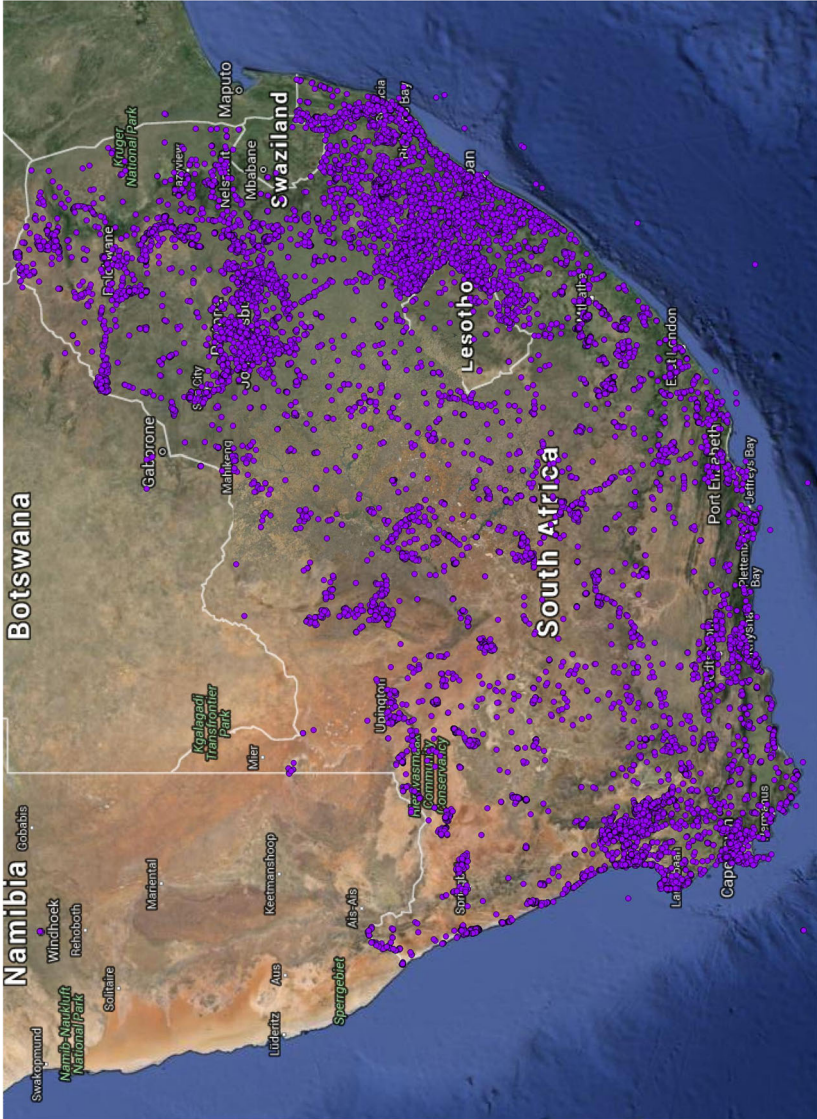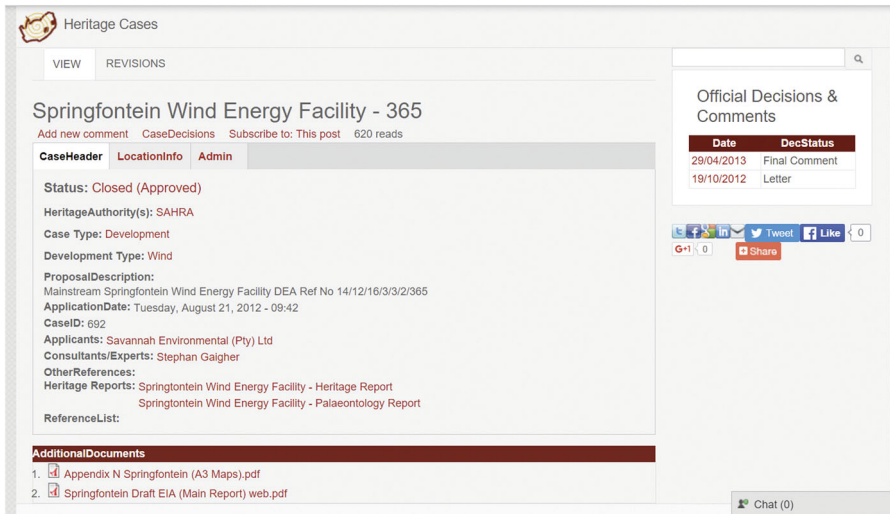
Figure 1.
Non-specific site
location map

www.

Figure 2.
Example of a
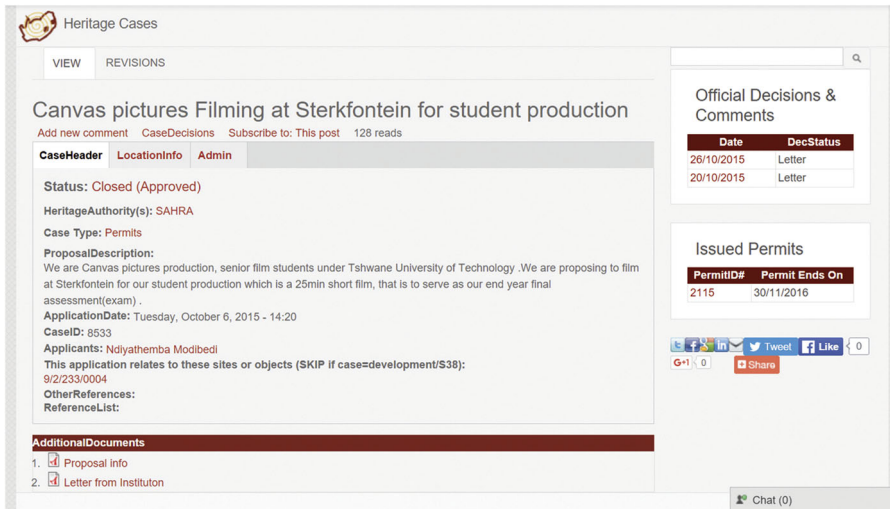development
application on
SAHRIS

Figure 3.
Example of a permit
application on
SAHRIS

comment on the application or issue the permit. The comment or the permit issued to the applicant is then visible immediately to the applicant, attached to the case created by the applicant.

If the objects or sites are already saved on the system you can easily search for them, if not, you have an option to create the object or site. Once the application has been submitted on SAHRIS, it will usually take three to five days for an application to be processed. Permits are issued at minimal fee and under certain conditions. Permits are only issued for bona fide research purposes and to suitably qualified professionals. While any individual may apply to SAHRA for a permit, the permit holder must be a professionally trained specialist in the appropriate field, for instance archaeology or palaeontology, or the work must be supervised by such a person.

Proper records must be kept of the excavation or collecting programme, and all such documentation submitted to SAHRA. All material recovered must be placed in a public institution where it is available to anyone for study and the application form must include a signed letter from an appropriate repository to curate and store the material. It is also the duty of the permit holder to obtain permission from the land owner for access to a site. Regular annual reports must be submitted to SAHRIS, as well as a final report and copies of all publications and theses relating to the study. All this information is captured to the permit application on SAHRIS.

3.4 Creating heritage crime cases

The descriptive fields for heritage objects created on SAHRIS are in compliance with those required by the INTERPOL Object ID form (INTERPOL, 2015), recording all the available descriptions, dimensions, photographs and other information relevant to the heritage object. These objects can be created singly, or entire databases can be uploaded by means of an Excel spreadsheet (Figure 4).

Once digitally captured, these objects can then be linked, through the creation of a Heritage Crime Case application, to the details of the crime perpetrated. The case also captures and links the repository from which they were stolen and its geographical location as well as all role players involved.

The details of the criminal case are captured, including the police case numbers, linking the SAHRIS case to the police databases. Any of the various branches of law enforcement can be separately indicated, for instance the SAPS Directorate for Priority Crime Investigation (DCPI) under which the ESU falls, as well as the INTERPOL National Central Bureau, Pretoria (INCB-P). All role players who have registered a free account with SAHRIS can log in directly to SAHRIS and view the case on their own dashboard (Figure 5).

Once the case is created, it is publicly viewable to anyone with access to the internet, including via mobile platforms. Any member of the public who registers on SAHRIS is
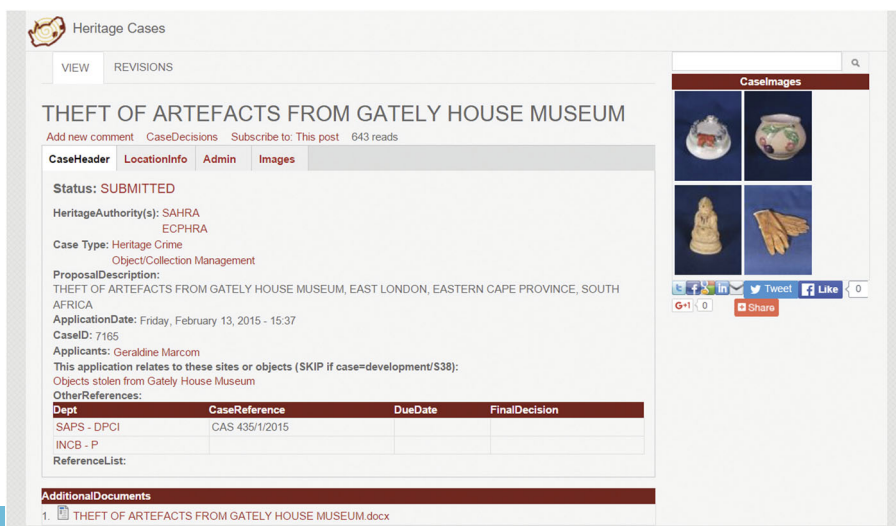

Figure 4.
Example of a heritage crime case on SAHRIS

also able to comment on any case. In the instance of heritage crimes, this comment could be in the form of information relevant to the case, tip-offs or leads.

SAHRIS makes provision for a full description of the case, which is publicly accessible, while any sensitive case details can be captured to a secure field when creating the case, and are only accessible to the relevant OG. This feature allows SAHRA to fulfil its duties in terms of PAIA while still ensuring that sensitive information is kept private so as to not jeopardise investigations or compromise individuals' rights to privacy. Similarly the object and the affected repository can both be kept private, visible only to members of the group audience created for that specific case, while the location of objects within repositories is always private by default.

The system allows users to search for all heritage crimes listed, and all objects flagged as stolen. This provides the first opportunity in the country to begin to assess the extent of heritage crime, as well as the capacity to map the location at which the crime occurred, which has significant ramifications. Benson (2011, 2013) reveals that one of the drivers of heritage crime is the location of museums and galleries in "hot spot" areas, that is, areas recognised to have high general crime levels. "Hot spot" mapping is a central tenet of modern policing, and is proven as an effective method in preventing crime (Eck *et al.*, 2005). This practice entails recognising the areas where different types of crimes are more prevalent and providing appropriate levels of proactive policing (Figure 6).

As SAPS records "hot spot" maps of crime across the country (Benson, 2013), SAHRIS' built in mapping function, and the capacity to generate GIS overlays means that locations of crimes captured and mapped on SAHRIS can be measured against the SAPS "hot spot" maps (Figure 7).

4. Conclusion

The development and implementation of SAHRIS in such a short space of time has largely been made possible by SAHRA's strategic decision to adopt FOSS, while development on Drupal meant that very little coding was required. This allowed the development team to place more emphasis on the structure of the content types and their alignment with the legislation, the migration of data, training and delivery of the service.
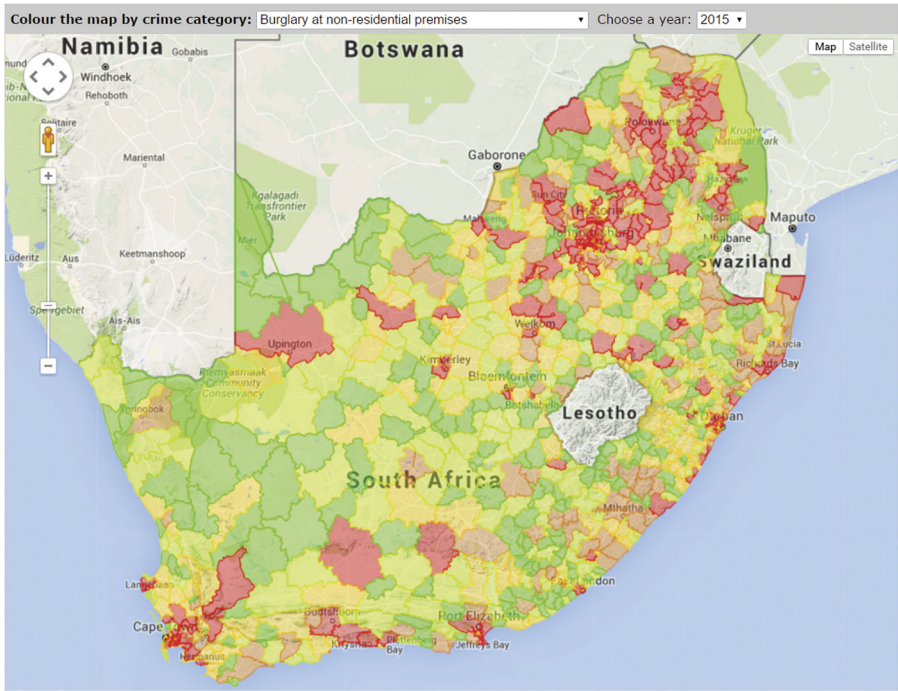
Figure 6.
SAPS crime
"hot spot" map
of South Africa
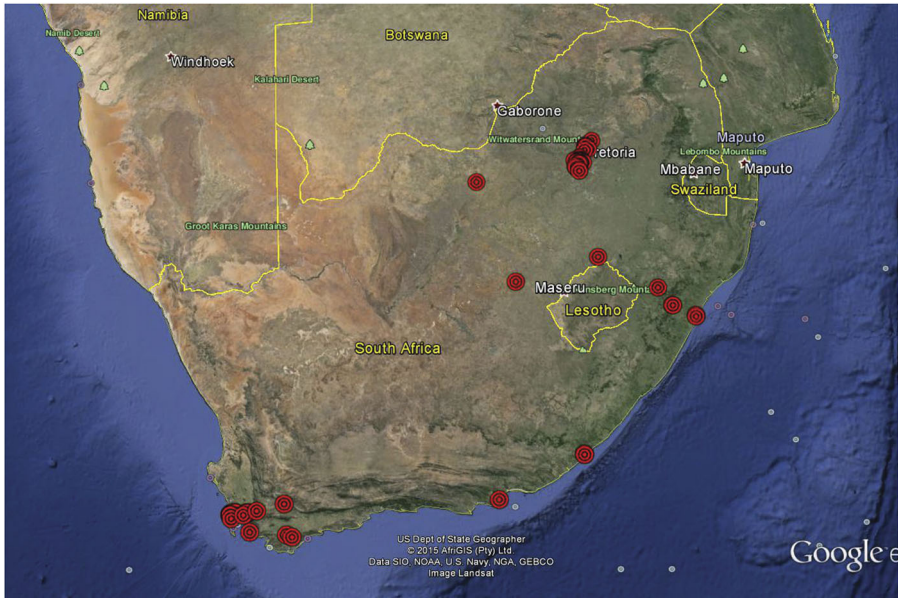
Source: ©2015 Crime Stats SA

Figure 7.
Mapped incidences
of heritage crime
in South Africa
indicating location
of crime and number
of incidences

Source: ©2015 Google Earth

www.

The rollout of SAHRIS has been welcomed in the heritage industry in South Africa, despite the delay of many years in creating the system. Over 3,250 users (as at end December 2015) have registered accounts on SAHRIS and the daily visit count has moved from just over 200 per day to more than 500 a day, with the number of pages viewed having grown from 6,000 per month to between 40,000 and 60,000. Free workshops have been held around the country to promote the system and train the primary users of SAHRIS since October 2012.

Heritage in South Africa is managed in a three tier structure, with National Heritage Sites and Grade 1 sites managed by SAHRA, Provincial Heritage Sites and Grade 2 sites managed by Provincial Heritage Resources Authorities (PHRAs) and Grade 3 and Local Heritage sites the purview of local municipalities. While only a single local authority in South Africa, the City of Cape Town, has thus far gained competency to manage its local heritage, PHRAs have been established in all nine provinces. A disappointing indicator, however, has been the slow adoption of SAHRIS by the PHRAs, and, although the reasons for this are varied and complex, this is broadly down to the under-capacitation of these offices. In a strategic return to the precepts of the NHRA, SAHRA hopes to correct this situation by drafting regulations for Section 39 of the NHRA that will make it mandatory for all PHRAs to adopt SAHRIS.

The quality and accuracy of the data on SAHRIS remains a major focus for SAHRA now that the tools have been developed to input and moderate the information on the system. The need for a coherent and well-supported team of SAHRIS content moderators and trainers was identified, and an internship programme has been initiated to train unemployed youth on digitisation through SAHRIS. It is envisaged that these job creation opportunities will extend beyond the confines of SAHRA itself as commercial operators take on support and training roles.

Looking forward, SAHRA acknowledges that further development is needed to stay abreast of developments not only in heritage management practice, but also in software development. Two mobile apps have already been developed – one to log sites in the field, the other to record objects *in situ* – and more are planned. Further to that, ongoing development of SAHRIS is ensured through a small team of service providers appointed on short-term contracts; part of their terms of reference are to transfer skills to SAHRA staff such that SAHRA will, in the near future, be able to take full responsibility for the system in-house.

Note

1. These conventions include the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict of 1954 (The Hague 1954), and the second Protocol to the 1954 Hague Convention, the UNESCO (1970) Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (Paris 1970) and the UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (Paris 1972). In 1995, the Institute for the Unification of Private Law (UNIDROIT), promulgated the Convention on Stolen or Illegally Exported Cultural Objects (Rome 1995), followed in 2001, by the UNESCO Convention on the Protection of Underwater Cultural Heritage (Paris 2001). Two more recent conventions addressed issues related to intangible heritage. These were the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (Paris 2003) and the Convention on the Protection and Promotion of the Diversity of Cultural Expression (Paris 2005).

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