



# WIDE-AREA SURVEILLANCE SECURITY SOLUTION PROVEN TO REDUCE RHINO POACHING

A wide-area surveillance system that detects and classifies moving entities automatically

*Addressing a problem and fulfilling a market demand*

## Unlawful entry in secure areas

In recent years, the scourge of rhino poaching has been making headlines around the world. In 2015, an astounding 1 305 rhinos were poached. This has come down to a, still critical, 448 rhinos in 2022. The fight continues to protect the rhino for our children and grandchildren.

The CSIR has developed the next generation ground-based surveillance and classification radar that enables automated detection and classification of movement over a wide area, enabling proactive protection of wildlife and other security applications.

## Building on an earlier success - Meerkat 1

The Kruger National Park – home to a significant share of the world’s rhino population – suffered significant losses. Evidence showed that groups would enter on foot and stay in the park for some time. Due to its size, and considering available resources, it was extremely difficult to protect the rhino. Even when perpetrators were caught, it was typically after an animal had already been killed.

As a result, the CSIR and SANParks investigated technology options for solutions that would detect criminals upon entry – before they could strike. The solution would need to operate day and night, detect suspicious activity, withstand extreme weather conditions and be relatively easy to deploy at different hotspots. Also, with animals roaming free in the park, a system based on motion would present challenges.

With a track record in radar solution development spanning over seven decades and a sound understanding of concepts of operations from the military domain, the CSIR was able to deliver the Meerkat 1 Wide Area Surveillance System. The system contributed to the Kruger National Park virtually eradicating rhino poaching within areas where it was deployed. The Meerkat system is dependent on the camera and an operator (human-in-the-loop) to perform classification of movement within an area of interest.



The system provides automated surveillance over a large area, making it ideal for many applications in the radar surveillance market – from wildlife protection and land or maritime border safeguarding to the protection of critical infrastructure or national key points.

“The benefit (of the deployment of Meerkat in the Kruger National Park) to SANParks was above and beyond the expected.” – Lt Gen (Ret) Johan Jooste, Programme Manager: Law Enforcement and Security, Department of Forestry, Fisheries and the Environment (previously Head of Special Operations, SANParks).

#### The technology on offer

### Automated ground-based surveillance and classification radar utilising artificial intelligence-based entity recognition

With the insights gained from Meerkat 1, the CSIR developed the Ground-based Surveillance and Classification Radar (GSCR), a next-generation system. The radar is an automated, wide-area surveillance system that can pick up human movement – distinguished from animals and trees – and generate an alert that would see intruders caught before they can do harm. The system has been experimentally deployed in the Kruger National Park.

The GSCR system is also suited to other security applications, including large critical infrastructure protection such as power or production plants, farms and safeguarding of protected border zones.

The system utilises the CSIR’s C-Band phased array technology providing a flexible and upgradeable architecture with no moving parts, as well as

a powerful artificial intelligence radar-based target classification research base.

Radar provides the ability to observe all movement over a wide area, updated every few seconds. Intruders are detected over the entire area being protected and tracked so that security forces can be directed to intercept them.

No operator is needed: The system operates fully autonomously and performs automatic classification of detected targets, enabling an automatic alarm.

Over five years, the technology has seen ongoing refinement – and successful deployment.

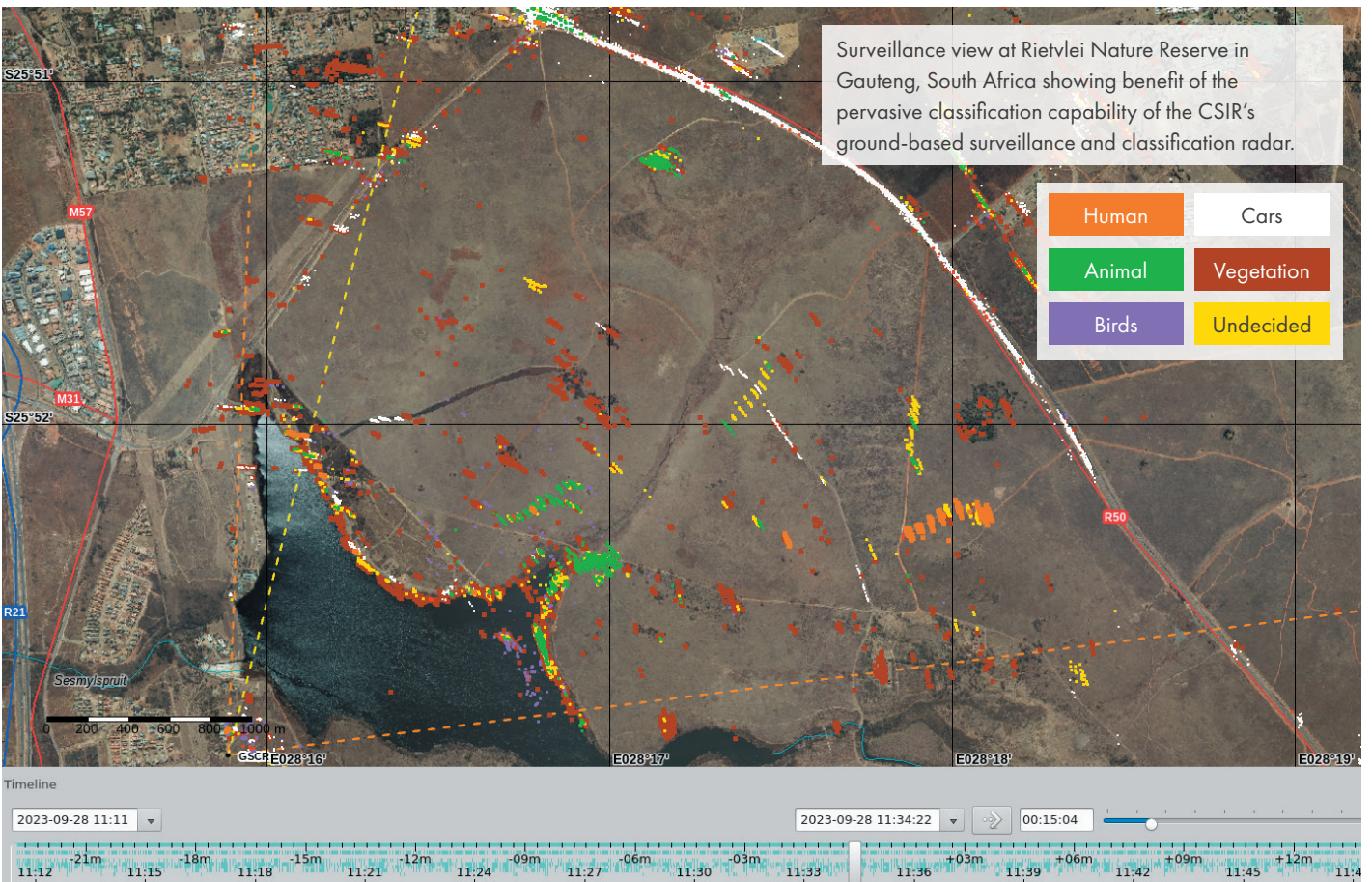
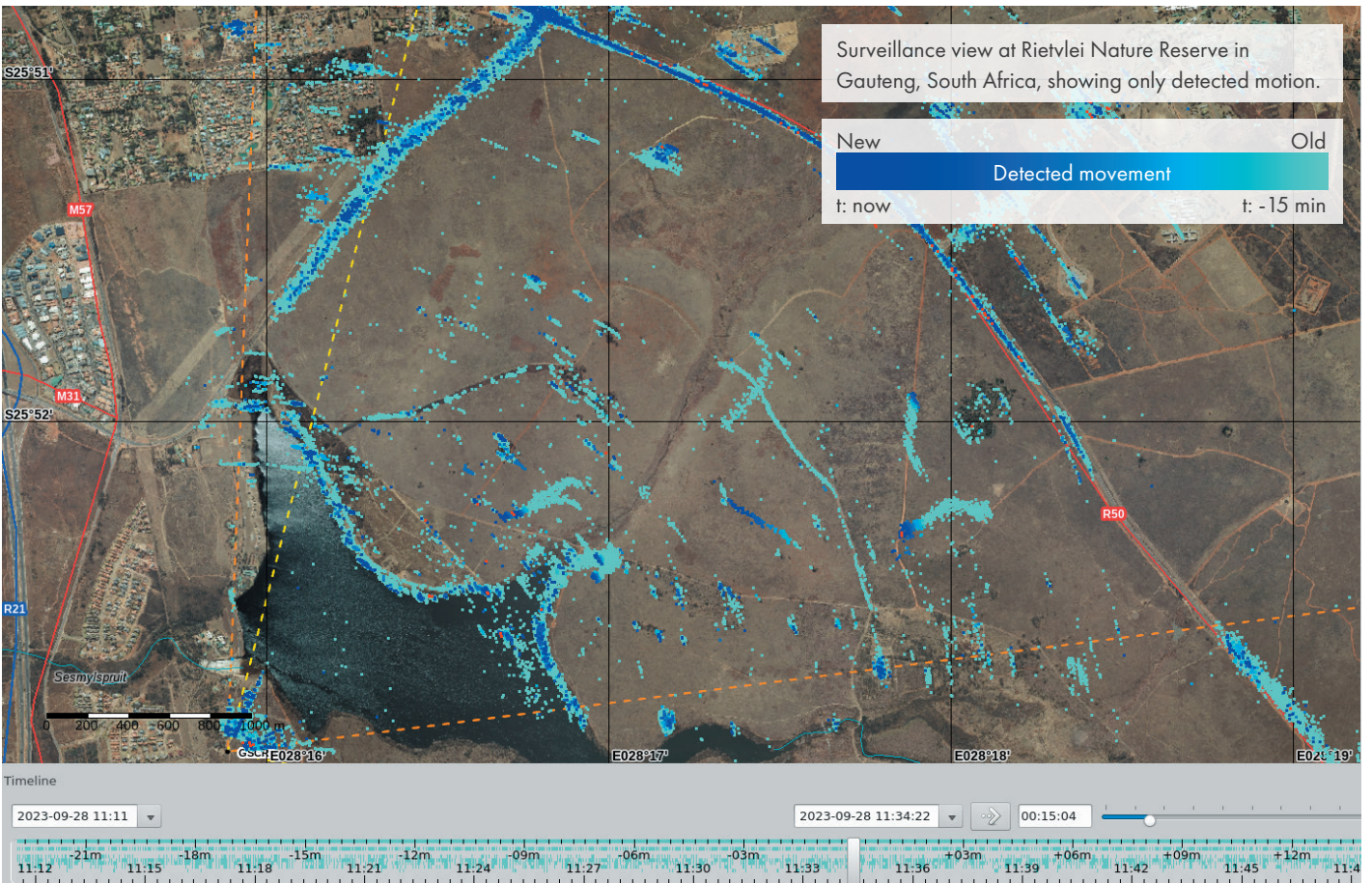
#### Value proposition and competitive advantage

### Detection, classification and alerting – without the need for an operator

The system can detect and classify moving entities – automatically. No additional camera and operator are needed.

It provides a continuous map view with accurate position which can be used to direct security forces to intercept. The CSIR scaleable phased-array technology, developed over many years and common to other radar systems, makes the system easier and cheaper to maintain, with reduced lifecycle costs.

Based on the above features, the system improves the concept of operations and significantly contributes to security efforts and the agility of teams of rangers.



The key value proposition of the system is that it provides automated surveillance over a large area allowing early detection of perpetrators. The perpetrators are tracked for a significant period to allow reaction forces to respond. The fixed antenna panels have no moving parts, allowing easy installation and maintenance.

Furthermore, it is scalable – it can easily be adapted to suit the application, based on requirements for radar detection ranges and angle measurement accuracy, or to align to the budget available.

#### Market opportunity

### A growing market for automated security surveillance

The technology has a myriad of applications in the radar surveillance market – from wildlife protection and land or maritime border safeguarding to the protection of critical infrastructure or national key points. With a strong foothold, strong relationships and a proven track record in place, the strategic focus will initially remain on wildlife protection and then expand into security and border surveillance applications.

In terms of wildlife protection, there are approximately 42 game reserves in South Africa of which 19 are under SANParks management. Although poaching in the Kruger National Park may have significantly reduced, it has increased in other areas, such as KwaZulu-Natal.

Additionally, there are more than 200 national and game reserves in Africa's safari countries. Namibia is experiencing a rise in rhino poaching in its national parks, especially in Etosha National Park, where rhino poaching has doubled from 2021 to 2022.

Several other national parks in the Southern African Development Community and East African regions are also experiencing a high level of rhino poaching.

The team conducted market studies in 2020 that showed there is a market opportunity to commercialise the surveillance systems in identified market segments, with prospects of selling in the order of five to ten units over a two-year interval for wildlife protection.

Since the system is already at a progressed technology readiness level, it enables effective engagement and demonstration to clients. The concept demonstrator is currently being prepared for operational deployment for a client in KwaZulu-Natal.

In terms of land border safeguarding, there are a total of 54 land border control points in South Africa. Interactions with key stakeholders in the security sector confirmed the need for such a surveillance system.

#### Business opportunity

### Partnership for sales and industrialisation into Africa

The current approach is to first focus on South Africa, expand into Africa, and then seek international partners.

Locally, the strategy is to continue engagement with early adopters, acting as launch partners to prove the technology solution and drive market penetration. Promising engagements for collaboration and possible uptake include the Kruger National Park, Hluhluwe Imfolozi Park, and a border safeguarding experiment with the Department of Defence.

Plans are afoot to industrialise the manufacturing of the system with industry partners to reduce production costs.

#### Investment and return on investment

### Investment in more operational prototypes

An investment of R15 million is required to realise a product prototype that will be delivered to launch partners for operation to demonstrate the impact and value of the system over a development and completion period of two years. This will be utilised to develop the market, through evidence of strong success, similar to what was achieved with Meerkat 1.

### A proven team of radar experts with operational experience

The project team is highly experienced, with expertise in the development of radar systems – both in terms of design and development and hardware and software. The team also has the required signal processing and algorithm development knowledge.

The CSIR radar team is highly experienced, with expertise in the development and delivery of radar systems that are utilised operationally. In addition, the team has a track record that include a system that has been operational in the field for more than five years, making a significant contribution to counter-poaching operations. The team has a multidisciplinary skills set in hardware and software design and development as well as in radar signal processing and algorithm development to realise project goals and objectives.

## ENQUIRIES:

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