

THE GALAXY NOVA SOLUTION



**The Galaxy Nova Community Resilience and Risk Intelligence System
Empowering Safe and Prosperous Communities**

V2.2

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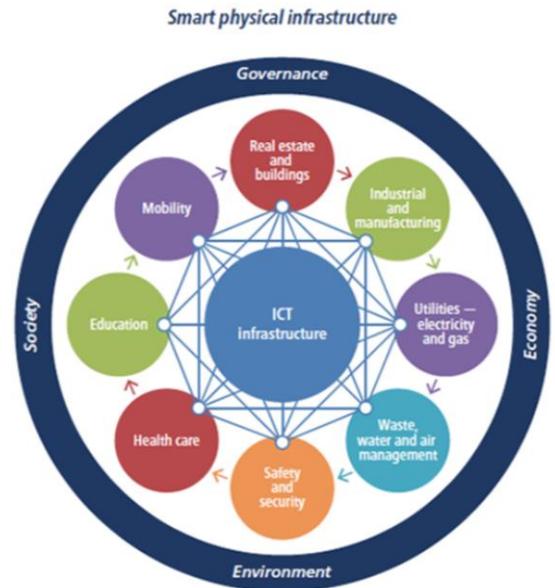
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BACKGROUND AND CONTEXT

Paradigm Alpha - the developer of The Galaxy Nova Community Resilience and Risk Intelligence System - and co-developer of the Safe-Smart-Healthy-City/Community concept, is deploying Galaxy Nova Solution on a national basis in South Africa. Through this initiative, we strive to empower safe and prosperous communities.

The system is deployed according to an Integrated Community-Driven resilience and risk planning and management approach.

Although the focus is on helping to create a secure environment, establishing resilient and prosperous communities, that people want to belong to, experiencing peace of mind and social cohesion is also emphasised.



THE GALAXY NOVA SOLUTION

The Galaxy Nova Community Resilience and Risk Intelligence System

The Galaxy Nova Community Resilience and Risk Intelligence System has been in development locally since 2016 and refined through practical use to address South African-specific needs, including anticipating and mitigating community disasters and crime related emergency incidents.

As the system has been developed in-house developers, it is dynamic and new modules are added as new needs or challenges are identified. This ensures local communities have access to data relevant to their area, which are collected from multiple sources such as:

- Open-source collections
- Nova mobile application "Report-to-Us"
- ANPR Cameras
- National data centres with community-driven databases
- Crime reports
- National crime channels
- E2 System in conjunction with SAPS requests
- Situational awareness information

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- Rtracking technology alerts

The Galaxy Nova System Core Components

The Galaxy Nova Community Resilience and Risk Intelligence System comprises two core components:

1. The Galaxy Nova Emergency Alert and Response System

- This is an operational component, an emergency response system. It operates in real-time, is manned by real people, and provides emergency response support to our users based on our Galaxy Nova Emergency App or emergency button, thus meeting their emergency needs 24/7 365, throughout most of the country.

2. The Galaxy Nova Integrated Community Resilience and Disaster/Risk Management System

- consist of a more strategic approach, focussing on Community Resilience to Disasters, through the establishment of decentralised community-driven data centres that act as data repositories to support local community entities, to establishing resilient and prosperous communities.

The Galaxy Nova Emergency Alert and Response System

The Galaxy Nova Emergency Alert and Response System:

Protects you and your loved ones.

*It provides peace of mind. You know that you are safeguarded, through our emergency support services that meet all your emergency needs continuously, throughout most of the country It is supported by the **best-in-class response systems and** trained dispatchers and responders when you use the Galaxy Nova emergency app or emergency button.*

The Galaxy Nova Emergency Response System - Use Cases

As part of a neutral/a-political emergency network support system, driven by Galaxy Nova, the following are examples of how the system can be applied to benefit communities:

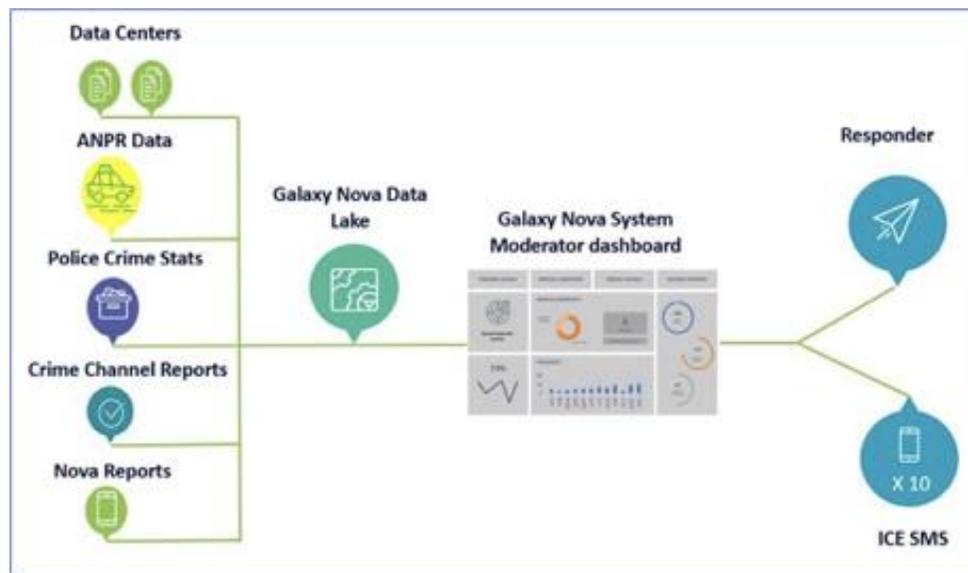
- Support for senior citizens, those who are fragile, living alone, or have dementia and could get lost.
- Protecting our children that are exposed to a myriad of dangers.
- Prevention of human trafficking

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- Fire Protection Services
- Disaster Management and incident command support
- Municipal and community surveys
- Municipal asset management and monitoring
- Crime data collection and analysis
- Roadside aid.
- Medical emergencies.
- Crime-related emergency incidents
- Volatile and/or potentially volatile situations.
- Frontline 'officers' support. Law enforcement, emergency entities and security companies support.
- Rapid escalation for the identification of "illegal land occupation"
- Neighbourhood Watch Assistance, so that they can manage their members/responders and become part of a bigger neutral Emergency Network Support System.
- Instant "place finder" based on your location, providing directions to nearest assistance, services and places of interest.

The Galaxy Nova Emergency Alert and Response System Flow

Overview of The Galaxy Nova Emergency Alert and Response System Flow



The Galaxy Nova Integrated Community Resilience and Disaster/Risk Management System

CPR (First Aid) For Failing Communities

One of the greatest challenges facing the South African community is how to rescue weak and failing local authorities or communities, which is mainly due to a combination of weak governance, lack of capacity, in-fighting and social upheaval.

If the number of failing communities continues to increase, at some point this will translate into a failing country. Somehow, this must be prevented or mitigated, yet present efforts to deal with weak and failing local authorities are fragmented.

What is needed now is **CPR (First Aid) For Failing Communities**. This means that the community must become directly involved, taking ownership/responsibility for their own well-being. Communities must become part of the solution.

Building Community Resilience to Disasters

Resilience Thinking offers a way to understand and work with changing systems

(Karina Landman)

In recent years, community resilience, or the sustained ability of a community to withstand and recover from adversity (e.g., economic stress, influenza pandemics, man-made or natural disasters), has become an important goal internationally.

For communities to acquire resilience requires a resilience-building process. This entails reducing pre-disaster vulnerabilities and conducting prevention activities to minimise the negative consequences of disaster.

What Do We Mean by Community Resilience?

Community resilience is the sustained ability of a community to use available resources (foresight, knowledge, energy, communication, transportation, food, etc.) to withstand, limit, respond to, , and recover from adverse situations (e.g., economic collapse, drought, floods and pandemics). It allows for the adaptation and growth of a community after disaster strikes. Communities that are resilient are able to minimise the effects of disaster, or recover quickly, making the return to normal life as effortless as possible. By implementing a community resilience plan, a community can come together and overcome any disaster while rebuilding physically and economically.¹

¹ https://en.wikipedia.org/wiki/Community_resilience

Community resilience also focuses on enhancing the day-to-day health and wellbeing of communities and building social, economic, and other capital to reduce the negative impacts of disasters.

The Term 'Disaster' Defined

The term 'disaster' is defined by UNISDR as "a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources".

A 'Community' Can Be Broadly Defined

A 'community' can be broadly defined as "a constituent population such as a neighbourhood, town, or city".

Why Is Community Resilience Important?²

Communities are increasingly complex, and so are the challenges they face. Anthropogenic and natural disasters are occurring more frequently and becoming more costly. Factors like climate change, globalisation, and increased urbanisation can mean higher disaster threats to greater numbers of people. Addressing these threats calls for an approach that combines what we know about preparing for disasters with what we know about actions that strengthen communities every day.

How are community resilience and disaster preparedness related?

Developing community resilience benefits disaster planners, emergency personnel and first responders and community members alike. Community resilience expands the traditional preparedness approach by encouraging actions that build preparedness while also promoting strong community systems and addressing the many factors that contribute to community wellbeing.

However, resilience is more than just disaster preparedness. It also deals with everyday issues that can erode/ wear away people's ability to cope – Stress, an unhealthy environment that makes people vulnerable to illness etc. Take for example stock losses due to 4-legged and 2 legged predators.

The Concept of 'Community Resilience' is Positive

The concept of 'community resilience' is almost invariably viewed as positive, being associated with increasing local capacity, social support and resources, and decreasing risks, miscommunication and trauma.

² <https://www.phe.gov/Preparedness/planning/abc/Pages/community-resilience.aspx>

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This focus has been accompanied by a change in rhetoric from government, industry, and charitable organisations from discussing 'disaster vulnerability' to 'disaster resilience,' which is viewed as a more proactive and positive expression of community engagement with natural hazard reduction.

Focus on Understanding What Contributes to a Resilient Community

Nine Core Elements of Community Resilience

The core elements are

1. Local Knowledge: The effects of a disaster, whether short-term or long-term, could be mitigated if a community understands its existing vulnerabilities. These vulnerabilities, if addressed prior to a disaster, are believed to build resilience within a community. Therefore, the importance of having a community assess and understand their own vulnerabilities. There are three sub-elements.
 - 1) Sub-Element One: The factual knowledge base of the community which is the information, education and experience acquired in relation to a disaster. It includes information learned related to a threat or disaster preparedness, such as knowledge about first aid, and other issues translatable to disaster preparedness, mitigation, response, and recovery.
 - 2) Sub-Element Two: Community Education - Training and education.
 - 3) Sub-Element Three: Collective Efficacy and Empowerment. Defined as: a community's shared belief of its ability to overcome potential hardships caused by adverse events and circumstances, for example through self-reliance. What the community knows and understands about their own processes to endure and respond to a disaster can be crucial in relief efforts especially if a community is dependent upon its own resources.
2. Community Networks and Relationships, well-connected and form a cohesive whole (social capital).
3. Risk Communication, Information Resilience.
 - 1) Effective communication is critical - "strong communication networks are critical for resilience."
 - 2) The creation of common meanings and understandings. Communication is defined as "the creation of common meanings and understandings and the provision of opportunities for members to articulate needs, views, and attitudes".

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- 3) **Communication Infrastructure.** The establishment of appropriate communication infrastructure that could be coordinated in a pre-or post-disaster setting.
4. **Health:** The pre-existing health of a community and delivery of health services after a disaster are important for community resilience. Understanding and addressing health vulnerabilities can build resilience before a disaster and mitigate long-term issues after a disaster.
5. **Governance and leadership** shape how communities handle crises.
6. **Resources are critical.** These include
 - 1) **Tangible supplies,** such as food, water and first aid kits and medical supplies, technical resources such as shelter, vehicles, and essential machinery. Better resources can contribute to higher levels of resilience.
 - 2) **Intangible aspects** such as "natural, physical, human, financial, and social capital". The presence and wide distribution of these resources widely available in the community supports resilience.
7. **Economic Investment,** the direct and indirect economic costs of a disaster can plague an affected community long after it has occurred.
8. **Preparedness:** The importance of preparedness across various levels, including:
 - the individual,
 - family and
 - government.
9. **Mental Outlook.** - Attitudes towards uncertainty. Defined as attitudes, feelings and views when facing the uncertainty that typically occurs after a disaster or when contemplating a future one.
 - 1) This uncertainty can manifest itself in different ways;
 - from anxiety about what the future holds for families,
 - to concerns about the long-term impacts on the community,
 - 2) The search for meaning and the quality of the meaning attached to a disaster can also affect a community's outlook.
 - 3) The mental outlook of a community is therefore important in shaping the willingness and ability of community members to continue in the face of uncertainty.

Sub-Elements Linked to Community Resilience

Within these core elements, 19 sub-elements linked to community resilience have been identified.

A Community Resilience Plan/Program

Community resilience has emerged as a way to reduce the direct and indirect costs due to natural, technological, and human-caused hazardous events, including everyday crises.

Activities, such as disaster preparedness—which includes prevention, protection, mitigation, response, and recovery—are key steps to resilience.

How best to help communities to help themselves?

The focus is on how best to help communities to help themselves, with a concomitant emphasis on understanding what factors contribute to creating resilient communities.

Risk Assessment Supports with Preparedness

Communities should identify potential threats and hazards and then decide how to prepare for each of them.

Actively involving community stakeholders in planning before a disaster and running practice drills or exercises with a focus on risk management contributes to community resilience.

Community Resilience Assessment

Inventory of Community Resilience Indicators and Assessment Frameworks

The Inventory takes the form of a database which contains 56 existing quantitative resilience frameworks, indicators, and measures that have been evaluated and catalogued according to a standardised methodology.

The indicators span all systems likely to be included in an assessment methodology, including physical systems (i.e., buildings and infrastructure), social and economic systems, and natural systems (i.e., natural environment). One aspect of this work is to identify the types of indicators that should be used as proxies to represent system attributes, dimensions, and dependencies.

THE GALAXY NOVA CONCEPTUAL FRAMEWORK

Safe-Smart-Healthy-City Concept

Building Safe and Smart Communities

The Galaxy Nova Smart City/Safe City Concept

The Smart-Safe City Concept (community safety focussed) comprises an integrated, multi-sectoral approach to improve the liveability of cities, towns, communities, and quality of life for all community members, based on the premise that good urban governance, planning and management can improve safety and prosperity.

The Galaxy Nova (Smart City /Safe City System) can enable early detection of threats, and if not preventable, their mitigation, a more rapid response and recovery, which will reduce loss of life and property, thereby bringing safety and normality to an ever more urbanised society.

The system can be applied to cities, towns, industrial parks, college campuses, or any other physical environment where people need a safe and comfortable environment.

Galaxy Nova Solution, consisting of Community-Driven Data Centre Systems, is at the heart of the whole Safe-Smart-Healthy-City concept, consists of various components that are customised to address the unique requirements of local communities.

Galaxy Nova Eco-System

The Galaxy Nova system is an integrated eco-system of first responders, emergency and security service providers working in conjunction with law enforcement to provide accurate information and effective responses in crises or disaster situations.

With its goal to make South Africa's cities smart, safe, and healthy again, NOSAID1 NPC offers a sophisticated and comprehensive Galaxy Nova smart city system consisting of the Nova Incident Management Workflow Database, featuring trend analysis and the integrated incident reporting Mobile Application. The community can access and request emergency services which are linked directly to the Galaxy Nova system which in turn, identifies and links to emergency and security service providers closest to the incident. The Galaxy Nova system is managed from 24/7/365 decentralised data centres manned by disaster managers and/or incident commanders to assist, direct, channel and track information and responses. The system addresses emergency incidents (Crime, Fire, Medical, Road assistance and Follow-Me), blacklisted vehicles, missing persons, and situational awareness amongst other applications to ensure sustainable and safe communities.

Galaxy Nova Eco-System: Stakeholders



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The team consist of experts in their respective fields, including, Paradigm Alpha management and the team, moderators, the National Responder Network, local stakeholders etc., deployed, and responsible for Galaxy Nova data centres.

COMMUNITY-DRIVEN DATA-CENTRE SYSTEM

The Community-Driven Data Centre System, developed by Paradigm Alpha, is at the heart of the whole Safe-Smart-Healthy-City concept, consists of various components that are customised to address the unique requirements of local communities.

The Community Resilience and Risk Profiler

The Community Resilience and Risk Profiler component refers to the compilation of a comprehensive Community Resilience Data Profile, populated with community-based data and community risk analysis processes.

One of the key components of the Community-Based Data Centre is the comprehensive Community Resilience Data Profile, populated with local community-related information, to better document community disaster resiliency and risk.

With the deployment of the system, local community-related information collection and synthesis, involving the community and other relevant stakeholders can be undertaken.

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As a community-based data centre, the information can be available for planning for community resilience and reducing vulnerability to disasters and the rejuvenation of the community.

The Community Resilience and Risk Profile module is aiding with the planning and future development of the Kirkwood area and provide the community with the information to participate meaningfully with the Local Economic Development (LED) processes as managed by the local municipal council and to strategically address issues and risks within the community.

The Data Centre Platform for Community Resilience and Disaster Preparedness Programs

Key Components for A Successful Community Resilience and Disaster Preparedness Program

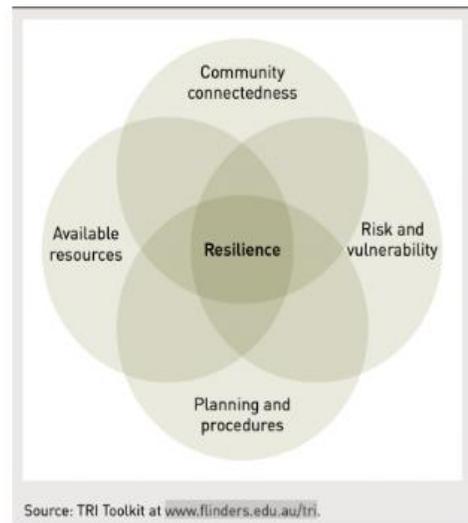
The data centre provides the platform for the following critical community resilience and disaster preparedness programs:

3. The Emergency Alert and Disaster Management Component.

- The Emergency Alert and Disaster Management Module mainly consists of crime and emergency data relevant to the local community for analysis and to register and manage local responders that react to crime and emergency incidents and provide emergency support services.

4. The Community Resilience and Risk Profiler Component.

- Community Disaster Risk Assessment utilising the Community Resilience and Risk Profiler Software System, delivering a Comprehensive Community Resilience Data Profile.
- Community-Based Community Resilience and Disaster Risk Resilience and Vulnerability Management.
 - Planning for Community Resilience and Reducing Vulnerability to Disasters.
 - Implementing an Integrated Disaster Risk and Resilience Analytical and Implementation Framework



5. Resilience-Focused Private-Public Sector Collaboration Planning and Implementation Guide

- Building community disaster resilience through private-public collaboration to improve the ability of a community to prepare for, respond to, and recover from disasters.

Overarching Guidelines for Successful Resilience-Focused Private-Public Collaboration

1. Pursue community-level private-public sector collaboration as a fundamental component of community resilience in general and disaster resilience in particular. Resilience-focused private-public collaboration ideally will:
 - a. Integrate with broader capacity-building efforts within the community and include all community actors.
 - b. Emphasize principles of comprehensive emergency management allowing preparation for all hazards and all phases of the disaster cycle to drive goals and activities.
 - c. Function as a system of horizontal networks at the community level, coordinating with higher government and organizational levels.
 - d. Develop flexible, evolving entities and establish processes to set goals, conduct continuing self-assessment, meet new challenges, and ensure sustainability.
 - e. Institutionalize as a neutral, nonpartisan entity with dedicated staff.
2. Build capacity through communication and training programs for those engaged in private-public collaboration and for the broader community. Resilience-focused private-public collaboration ideally will:
 - a. Incorporate capacity building into collaboration from the onset.
 - a. Target educational campaigns toward crisis mitigation with goals of community readiness, continuity planning, trust building, risk reduction, and shortened recovery time.
 - b. Encourage all organizations in the private and public sectors to commit to organizational resilience through business-continuity measures.
 - c. Partner with educational institutions in developing educational campaigns and disseminating information.
 - d. Institutionalize the practice of embedding research into resilience-focused private-public sector collaboration by building research directly into existing and future collaborative efforts.
3. Respect well-informed, locally determined all-hazards preparedness and resilience priorities.
4. Develop funding and resource allocation strategies that are flexible in administration.

6. WIKI Knowledge Repository

- A knowledge repository, containing research and analysis that supports vulnerability and risk resilience assessments and implementation.
- A freely accessible repository of knowledge
- A repository of best practices and lessons learned

The Galaxy Nova Community Resilience and Risk Intelligence System Deployment

In managing the risk and propensity for risk to escalate into possible disasters in an everchanging modern society, Galaxy Nova uses a combination of various systems and inputs to collect and record data that is analysed and applied in compiling a Community Resilience and Risk Profile for disaster management purposes, this includes identification of crime patterns and trends which may provide early warning as to possible crimes or the imminent possibility of a disaster or a crime to be committed.

The services developed by and integrated into the Galaxy Nova system include the following:

- Community Risk Profiler
- Emergency Alert Control and Dispatch Application
- Mobile Emergency Alert Buttons
- ANPLR Monitoring and Storage Platform
- Black-Listed ANPLR Alert
- Mobile ANPR Camera Data/Viewing Platform

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- Mobile Phone-Based Tracking
- Mobile Phone-Based Reporting and Communication System
- Crime Data Analysis and Risk Management
- Emergency and Disaster Responder Registration and Management
- WIKI Information Repository

Galaxy Nova System - Emergency Alert App and Button

The Galaxy Nova Emergency Alert and Response System based on the concepts of smart-safe-healthy city, consists of two components:

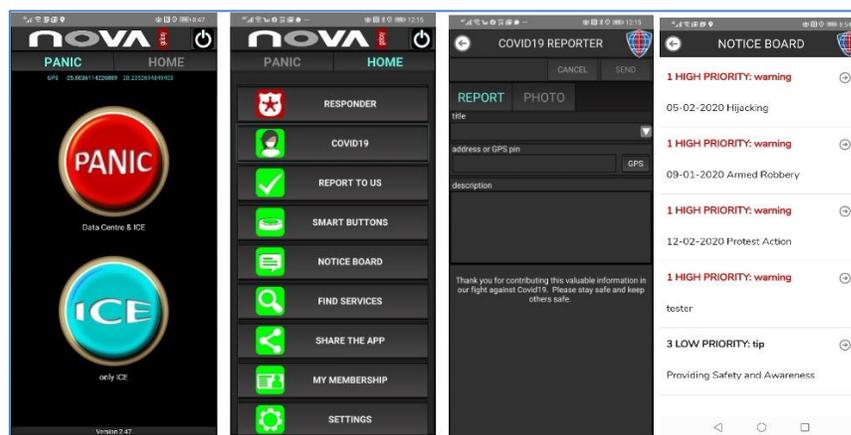
7. Mobile Application for Smartphones and Emergency Alert Button Devices.
8. The Galaxy Nova Emergency Alert and Response System operating from decentralised data centres.

Mobile Application

The mobile application is downloadable from the Google Play Store or Apple iStore and can be downloaded to Android or Apple OS Smart Phones. It is developed as an incident report system, to enable the community to interact with the Command-and-Control System in emergencies and also to report crime or suspicious activities and other concerns. This assists in building the database of incidents.

The features included in the mobile application are comprehensive and amongst others includes an **Emergency Alert Button** to summon assistance, a **Reporting Function** and a **Notice Board**, which can be used for mass communication of information relevant to the community, including emergency alerts.

The mobile application also enables law enforcement, medical, and first responder resources to register as **Responders** thus providing the control and command centre with real-time situational awareness of incidents and resources available which can then be dispatched. The responders can receive incident information via their smartphone application.



The Galaxy Nova Emergency Alert and Response System

The Galaxy Nova System is a cloud-based system that ensures that it can be deployed easily on a national basis in decentralised data centres/control rooms/JOC's³ and provides the information recording functionality whereby the database is built, and analysis done to understand the local 'community's vulnerabilities, anticipate potential emergencies or disasters and develop intervention plans.

The system also incorporates a module that monitors panic buttons and responders in real time so as to dispatch appropriate assistance to the public or assist responders that may experience difficulties in the execution of their duties.

Sample: Incident Management Dashboard

The dashboard displays two tables of incident data. The top table, 'BLACK LISTED INCIDENTS', lists incidents with columns for created date, license plate, photo count, camera ID, vehicle, case type, photo, and map. The bottom table, 'PANIC INCIDENTS', lists incidents with columns for created date, person, cellphone, status, fire, medical, crime, follow me, roadside, and hometown.

created	license_plate	foto count	camera_id	vehicle	case type	photo	map
2021-05-06 20:20:26	M193	1	ELOFF- WEG 11	VOLKSWAGEN	SUSPICIOUS VEHICLE		
2021-05-30 09:20:00	DSC 03'S	1	ODENDAAKSRUIS	NISSAN	SUSPICIOUS VEHICLE		
2021-05-24 16:50:04	FK 7DYGP	1	DELMAS NTTTOYOTA	VOLKSWAGEN POLO WHITE	SUSPICIOUS VEHICLE		
2021-05-14 09:48:07	KJK71 NW	1	NOORDWEG UITGANG	VW POLO WHITE	SUSPICIOUS VEHICLE		
2021-05-09	WVC17 GP	1	WAWIELBRUG INGANG EN UITGANG	TOYOTA HILUX WHITE	SUSPICIOUS VEHICLE		

created	person	cellphone	status	fire	medical	crime	follow me	roadside	hometown
2021-08-04 09:10	Richar	+2776	CANCELLED						CENTURION
2021-08-04 09:07	Adria	+2776	CANCELLED						PRETORIA (GP)
2021-08-03 15:22	Willi	+2781	CANCELLED						WELKOM
2021-08-03 12:05	Wern	+2783	CANCELLED						POTCHEFSTROOM
2021-08-03	Nees	+2767	CANCELLED						EASTERN CAPE

Sample: Incident Details for Response

The incident details form includes the following sections:

- Incident Data:** Report to us message - **Pothole at -25.8035472724342, 28.2353513786677 - Large pothole**
- Person Information:** Name - **Rich**, Surname - **Jens**, Cellphone - **27760**, Email - **base@g**
- Medical Information:** Medical Conditions - **High Blood Pressure**, Med Aid - **Key**, Med Aid No - **5430**, Allergies - **Grass**, Reading - **CENTURION**
- Nearest Responders:** VIEW ON MAP
- Main Status:** CLOSED
- VOICE NOTES:** 2021-06-11 09:30:33 [Download]
- NOTE HISTORY:** 2021-06-11 09:30:30 CANCELLED by rich... [Additional notes follow]

³ Joint Operation Centres

IP ANPR Monitoring

The Galaxy Nova System platform import, process and analyse vehicle number plate information and compare this to blacklisted or flagged (suspicious) numbers that are being sought by law enforcement. This enables the law enforcement to curb crime or find missing persons.

The database of numberplates that has previously been captured by ANPR cameras linked to the system can also be interrogated to see if a particular numberplate has previously been captured thus enabling law enforcement to find and link a particular vehicle/numberplate to possible crimes that was committed in other locations on a national basis.

As soon as a blacklisted numberplate is photographed by a linked ANPR enabled camera, the number is run against the crime database, numberplate database and previously listed blacklist database. If a match is found within the blacklist or crime database, the numberplate/vehicle is flagged under blacklisted display on the incident management dashboard that is part of the Galaxy Nova System.

Moderators can **immediately** act as required, as the trend is that false number plates or cloned plates are used by criminals and once a crime is committed using a vehicle with false or cloned plates, these plates are swapped for legal plates within 10 to 15 minutes.

Note: Paradigm Alpha constantly investigates the use of new technologies and is currently testing a new technology solution that if successful, will be deployed to compliment the ANPR capabilities integrated into the Galaxy Nova System to specifically address hi-jacked, stolen vehicles leading to and or the use of false or cloned numberplates.

Decentralised Data Centres

As the Galaxy Nova System is developed to address disaster management from local to national level, the system is flexible enough to be deployed on a decentralised model which feeds into the collective national data lake. Thus, crime information is tested against national data available to the system to ensure that the movement of organised crime syndicates can be detected. Decentralising data centres also ensure that local knowledge of crime and potential disasters and the effective countering thereof is retained.



CONCLUSION

The Galaxy Nova solution is a holistic solution that provides an integrated command and control system that enables communities to effectively manage their resources in responding to threats through tactical risk management and strategic data analysis.

Note

The Galaxy Nova Solution does not in any way replace the functions and responsibilities of law enforcement and emergency institutions. The focus is on empowering communities to take responsibility for their own wellbeing and to support the authorities in their endeavours. So, all efforts in this regard must supplement law enforcement and disaster management professionals.