

# MIMOS TECHNOLOGY APPLICATION NOTES

***TODAY'S ANSWERS FOR THE  
NATION'S CHALLENGES***

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# ADVANCED PRODUCT TRACEABILITY







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For manufacturers, product quality and customer satisfaction are the main focus that producers strive for to meet or exceed excellence and business sustainability. An increasingly competitive global environment demands organisations to address product authenticity and establish and maintain credibility. Here, product traceability is an all-important first step in building trust in the marketplace.

The ability to ascertain a product's purity and origins especially in premium products is key. For perishable products such as medication, the logistics route as to where the product has been and where it is headed and the duration of each of the stages is important to avoid issues such as contamination and expiration. For Halal products, compliance with Halal regulation at every step of the process needs to be maintained to uphold product certification. With traceability, products can be traced back to the origin while being able to determine where a bottleneck or a glitch in the process occurred.



# Challenge

Present day logistics processes are both resource-intensive and effort-intensive; often outsourced to third party service providers and involves various transport modes and various storage locations. These heavily rely on manual efforts to gather, streamline and disseminate product information throughout the supply chain. Additional costs are incurred to inspect and verify products at retail outlets, distributors and wholesalers. The current gaps are:

- Disparated supply chain network complicates the product data gathering process.
- Stakeholders lack full visibility of overall supply chain activities.
- Multiple standards for identifying, capturing and sharing product information.

## **CURRENT GAPS**

- Disparated supply chain network complicates the product data gathering process
- Stakeholders lack full visibility of overall supply chain activities
- Multiple standards for identifying, capturing and sharing product information

## **ADVANCED PRODUCT TRACEABILITY SOLUTION**

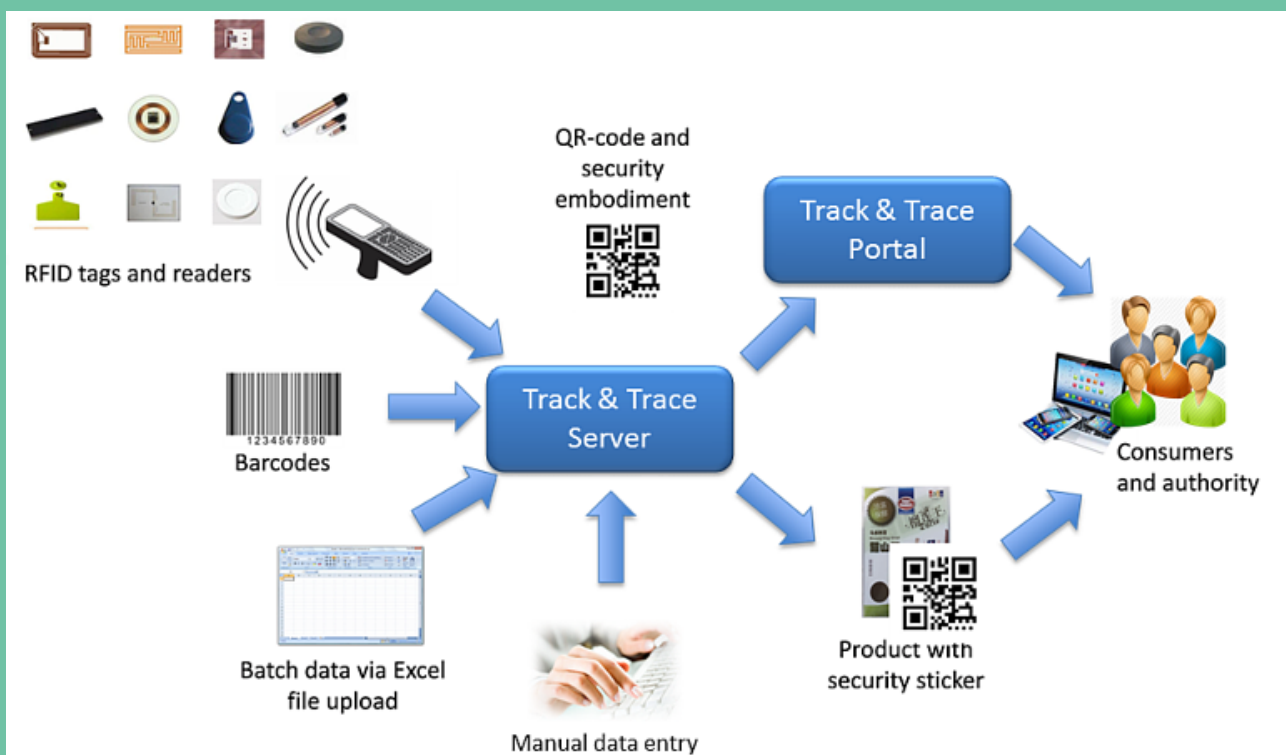
- Centralised and secured information gathering, processing and verification
- Intelligent dashboard to monitor each stakeholder's activity in the supply chain
- Standardised information sharing based on GS1 Standards

# Solution

MIMOS' Advanced Product Traceability Solution provides a method to address disparities in the supply chain network, lack of visibility of overall supply chain activities, and multiple product information standards. The solution facilitates the product track and trace process by connecting all stakeholders in the supply chain on a platform based on GS1 Standards. GS1 is a global, neutral, multi-sector standard for identifying, capturing, and sharing information, about products, business locations, and more; making it possible for companies to speak the same language, connect with each other, and move business forward.

The solution consists of:

- Centralised and secured information system for real-time information gathering, processing and verification available to all supply chain stakeholders.
- Intelligent dashboard that provides each stakeholder from manufacturers to authorities a full view of supply chain processes and the activities of contributing stakeholders.
- GS1 Electronic Product Code Information Services (EPCIS) to enable business enterprises across the supply chain to share standardised detailed product and process information.



Advanced Product Traceability Solution

# Solution Highlights

- **Product Track and Trace**

Consumers can check for a product's authenticity by gaining access to its origin information, associated certificates and validity statuses. Authorities can also monitor a product's movement, 'health' and status along its delivery route before it reaches its final destination. Furthermore, the tracking and tracing solution can be used to fight unauthorised distribution which is frequently linked to counterfeiting.

- **Information Sharing throughout Supply Chain**

The solution standardises data collection methods and adopts a uniform data format with GS1 that simplifies information sharing and retrieval for better economies of scale. Authorities and product owners can perform corrective measures or recalls efficiently by distributing correct and relevant information, and directives promptly to all parties involved in the supply chain.

- **Product Status Alerts**

When changes in product status occur, users are immediately alerted through a single point of reference with an information log to back product credibility.

- **Mobile Web Services**

Mobile authentication verification enable customers to interact with a product anywhere and at any time while being able to verify process certification, such as organic or Halal.

- **Crowdsourcing Capabilities**

Through crowdsourcing, gathered information coupled with geo-location coordinates enables the creation of a detailed database on retailers' behaviour, breaks down hierarchies and silos, and enables preventive action, and effective and responsive compliance enforcement.

- **Big Data Analytics Ready**

Various data sources and formats can be ingested in real-time to provide multiple dimension analysis of scenarios to stakeholders within the supply chain for immediate action.



# Impact

## **Enhanced Product Authenticity Assurance**

- Using a smartphone, consumers can scan a QR code on product packaging to know its origin, expiry date, production date, exporting and importing companies.
- On the system side, the QR code will be validated for duplication and alerts shall be generated to lodge a report or request for product recall.
- At a higher level, information will be channelled to exporters and regulatory bodies for follow up action.

## **Improved Operational Efficiency and Information Sharing**

- Sales and operation efficiency can be enhanced through product trail information, outlet sales efficiency and best-selling items.
- Stakeholders no longer need to work in silos and leverage on readily available information shared across the platform.
- Product information can be easily shared and utilised for product movement tracking across the supply chain enriched with geo-location coordinates.

## **Sustaining Existing Business and Facilitating Expansion**

- Immediate action can be taken on product recalls and restore market confidence thereby reducing losses and continuing existing business momentum quickly.
- For business owners' expansion, the traceability solution can be potentially used for other premium products such as Halal and Green products.
- Other areas that may gain from this are digital products such as e-books and digital music to ensure authenticity.

# DISASTER-READY COMMUNICATION INFRASTRUCTURE





*Credits: [newsnextbd.com](http://newsnextbd.com), [www.pinterest.com](http://www.pinterest.com), [www.redcrescent.org.my](http://www.redcrescent.org.my)*

The recent major disasters in the East Coast of Peninsular Malaysia have affected the lives of the people due to displaced communication infrastructure. Communication is therefore essential between parties coordinating search and rescue efforts. Any loss of or misinterpretation of messages between the ground rescue team, stations and central command directives could result in further extension of remedial efforts and increase in expenditure to boost supplies and erect more temporary shelters.

On the part of civilians, more time spent away and out of their homes translates into loss of livelihood and for some, sanity. It is of utmost criticality to prevent further escalation in damages and losses in terms of lives as the duration of the disaster extends. This requires a resilient communication infrastructure to enable critical communications to enable the people to be connected during these trying times.



# Challenge

During a disaster, uninterrupted communications is key to contain any situation, protect citizens and save lives. There is a need to provide a resilient disaster-ready communication infrastructure that delivers information and communication services needed by emergency response teams and the community together with intelligent services to address the following:

- Current communication infrastructure deployed is not 'disaster-proof' by being reliant on traditional telecommunication structures.
- Lack of a monitoring system to accurately determine the actual disaster situation.

## **CURRENT GAPS**

- Current communication infrastructure not 'disaster-proof'
- Lack of monitoring system to accurately determine actual disaster situation

## **DISASTER-READY COMMUNICATION INFRASTRUCTURE**

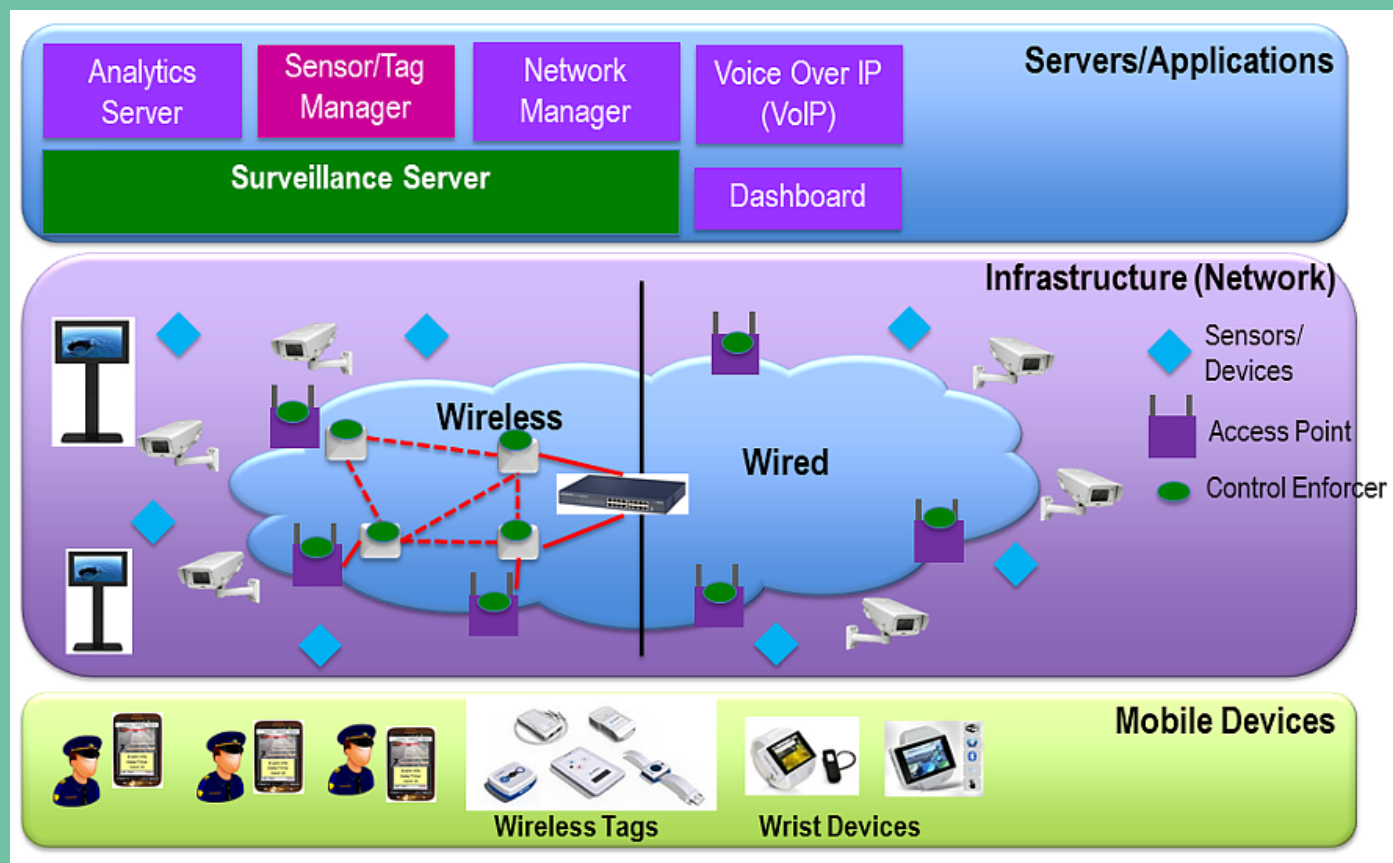
- Resilient communication infrastructure
- Standalone system independent of traditional telecommunications and electricity infrastructure
- Continuous monitoring of disaster area

# Solution

MIMOS' Disaster-Ready Communication Infrastructure provides a communication channel during lifesaving rescue operations in disaster scenarios. It acts as emergency communication during lifesaving rescue operations in disaster scenarios as such communication is often impossible due to electrical damage and power outage. This avoids hindrance for the victims to send out distress signals, and therefore increases the possibility of survival.

The solution consists of:

- Resilient communication infrastructure based on WiFi Mesh multi-hop and optimal wireless path capabilities.
- Standalone system that is low on power consumption and solar-powered to be independent of traditional telecommunications and electricity infrastructure.
- Continuous monitoring of disaster area for changes in environment such as flood water level and flow.



Disaster-Ready Communication Infrastructure

# Solution Highlights

- **Resilient, Secure and Self-Sustainable Wireless Infrastructure**

A communication infrastructure based on WiFi Mesh that enables multi-hop wireless links between access points and dynamic wireless traffic aggregation. Each Mesh device comes with a self-sustainable solar power source and works independently of traditional telecommunications to maintain critical lifeline communication in a disaster scenario.

- **Enables Value-Added Information Services:**

*Emergency Voice Communication (VoIP)*

VoIP provides basic voice communication within affected areas when cell phone and fixed line infrastructure is disrupted.

*Video Surveillance and Dispatch*

Emergency rescue teams are provided with a real-time view of disaster areas along with enhanced video analytic functions. Video streams are pushed to target rescue personnel by utilising the concept of rapid intelligence surveillance network developed by MIMOS.

*Information Broadcast Channel*

Unified event notifications are delivered intelligently and efficiently by using MIMOS' multi-trigger context-aware proprietary engine.

*Community Emergency Services (SoS)*

Services are available via mobile applications for victims to enable emergency tracking and rescue operations. MIMOS IoT technologies bridge a victim's status and services rendered to the victim.

- **Precision Monitoring of Disaster Site**

Environmental sensors positioned at strategic areas of a disaster such as a river bank, in the case of flood, continuously enable the monitoring of the water level and water flow thus providing consistent updates to the command centre on the decline or escalation of the disaster itself.



# Impact

## **Reliable Communication Channel during Disaster**

- Uninterrupted communication services for public safety during disaster scenarios with secondary voice capability as back up.
- Secured channel communication for deployed operatives and volunteers to enable sound cooperation during rescue operations.
- Information and alerts – Variable message signs for quick broadcast of information such as weather, disaster information, affected location and food supplies relief to the community.

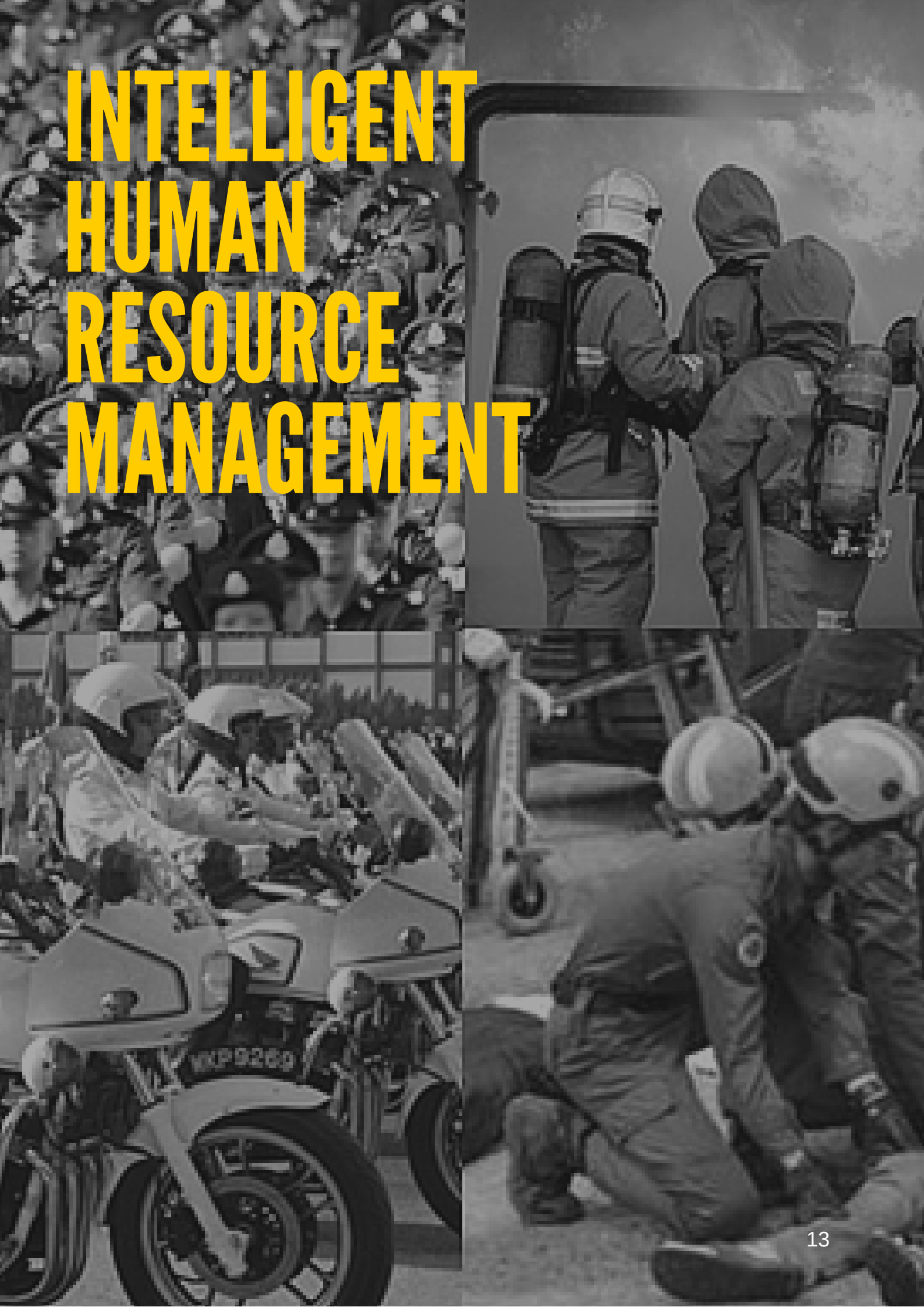
## **Improved Reporting of Disaster Situation**

- Alerts on the accurate status of a disaster through precision environmental monitoring would reduce loss of property and lives and cut short the recovery period.
- Prevents unnecessary evacuation from sites deemed to be dangerous or uninhabitable based on real-time information.

## **Centralised Operations for Disaster Mitigation**

- Centralised emergency operations enable accurate relief to critical areas and contain proliferation to other areas.
- Accurate disaster site, personnel and reported victim information enable relief supplies to be delivered to target victims.
- Deployment efforts can be maximised by having personnel extracted and redeployed at areas needing more attention.

# INTELLIGENT HUMAN RESOURCE MANAGEMENT





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People are frequently cited as an organisation's most valuable resource. This is only true if the organisation manages such a resource effectively. Many of the theories and practices that apply to business are applicable in government sector entities such as federal agencies and departments. However, there are problems and issues that are specific to public safety organisations such as the police, fire and rescue departments.

The demands are constant, compelling and often competing as it is not always direct how manpower skills and resources can best be deployed to achieve the civility, order and security which society requires. Personnel must be able to cut through the tangle of issues to focus on what is important. Often, there are information gaps between units, departments and the general public that makes resolutions to public issues prolonged and difficult.

Even more crucial is the analysis of processed information such that the right personnel respond to the right place at the right time. Being effective at response towards immediate needs directly changes public perception towards public safety. For federal agencies and departments, this achieves maximum advantage for minimum expenditure of effort and resources.



# Challenge

The evolution of society at large brings with it more complex and various social and environmental platforms. Existing public safety systems are faced with challenges to curate and analyse information on a large scale and disseminate this to their respective personnel for rapid action as a preventive measure before events rather than taking responsive actions after events. This directly involves manpower resourcing, allocation and deployment. A resource management solution that predicts based on historical data and prescribes necessary action is needed to address the following:

- Information gathering from various sources and formats through manual and automated means in order to analyse, plan and manage personnel consumes time and effort.
- Information processing of legacy systems that do not cater to in-depth analysis of information and detailed reporting functions thereby presenting a challenge to monitor overall operations and personnel.

## CURRENT GAPS

- Information gathering from various sources and formats through manual and automated means
- Information processing of legacy systems that do not cater to in-depth analysis and detailed reporting

## INTELLIGENT HUMAN RESOURCE MANAGEMENT SOLUTION

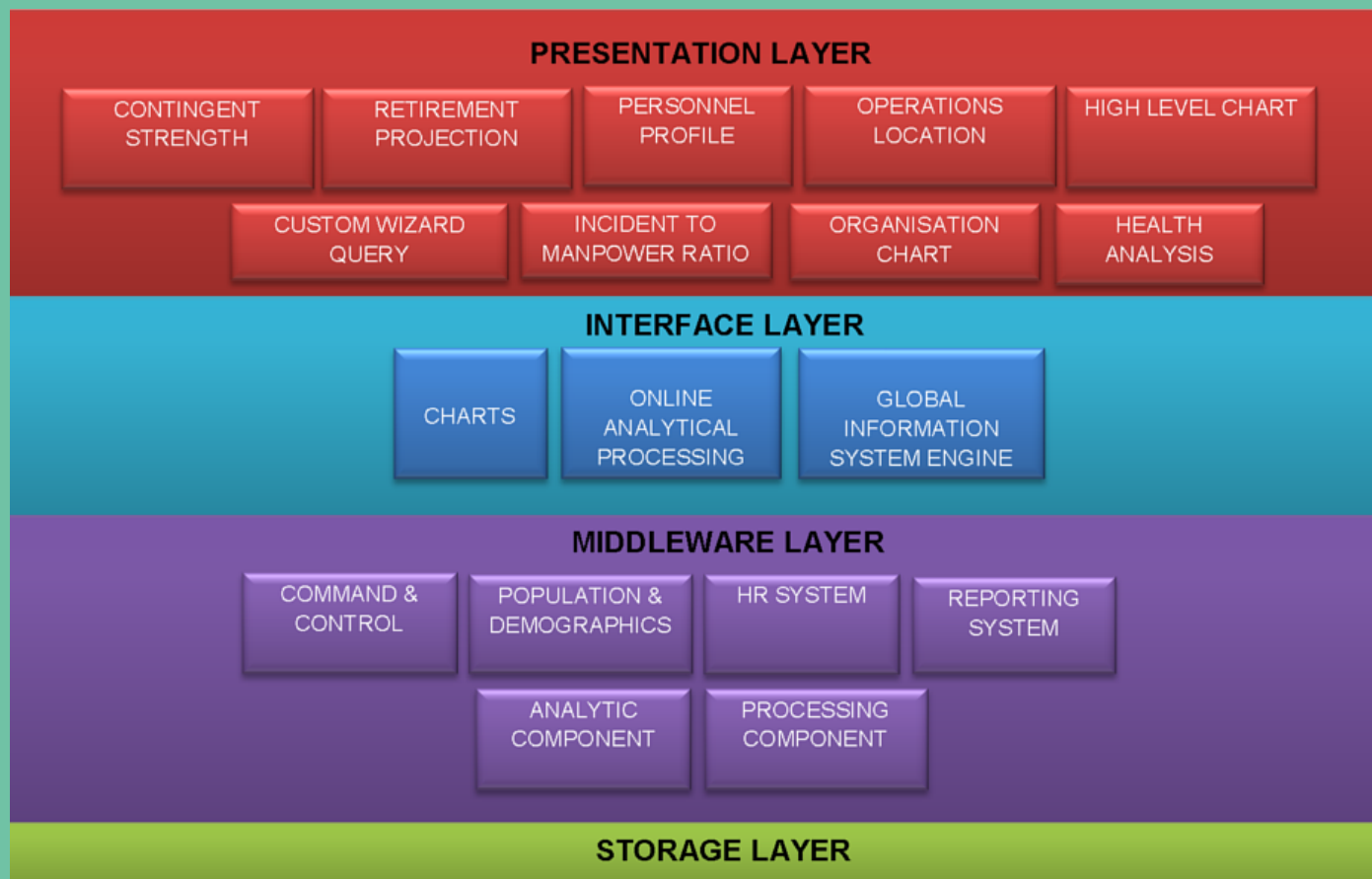
- Centralised and secured information system
- Real-time analytics of organised data
- Intelligent dashboard to facilitate human decision making
- Mass data storage based on cloud computing

# Solution

MIMOS' Intelligent Human Resource Management Solution could benefit any federal agency or department to optimise the management and processing of information and analysis to quicken decision making and maximise personnel utilisation. Key performance indicators for personnel in relation to manpower resourcing, allocation and deployment can be improved using predictive and prescriptive analytics (through a simulator tool) based on big data analytics.

The solution consists of:

- Centralised and secured information system for intelligent data acquisition, cleansing and transformation.
- Real-time analytics of organised data for accurate indicators on personnel progression at city, district, state and national level.
- Intelligent dashboard to facilitate human decision making assisted with simulation tools for manpower parameters for operational planning and deployment.
- Mass data storage based on cloud computing for information such as GPS coordinates, human resource activities, management systems, and reporting activities.



Intelligent Human Resource Management Solution

# Solution Highlights

- **Centralised and Secured Information System**

A single ecosystem that aggregates total contingent strength and vacancies by units, and grouped by categories such as rank, gender, race and age. Functionalities include lists of post, vacancies and personnel in each unit.

- **Predictive Resource Management**

Projection of personnel retirement with user-customisable time range and information on position vacancy, and analysis of medical records, attendance and leave for personnel and for unit comparison.

- **Prescriptive Simulation Tools**

Heat map for several categories of incidents and indication of manpower strength against reported incidence ratio for stations and districts. Correlation between different incident categories with trend analysis to assist in resource allocation.

- **High-Level Visualisation Dashboard**

Ability to view total strength breakdown by contingent and group by selected parameters through a widget interface; a graphical display of organisation relationships and listing/transfer of personnel under a unit.

- **Accelerated Personnel Search and Query**

Ability to search and perform wizard query for personnel profiles with properties such as photo, uniform rank, post, years of service and e-mail.

- **Operations Location Pinpoint**

Display operations' locations on spatial maps based on the radius of selected stations. Personnel filtering can be carried out by categories such as age, group and rank within the radius of a selected location.

# Impact

## **Fast and Accurate Information Gathering**

- Various data sources can be ingested in real-time to provide multiple dimension analysis of scenarios.
- Reduction of dependence on human personnel on manual management and processing.

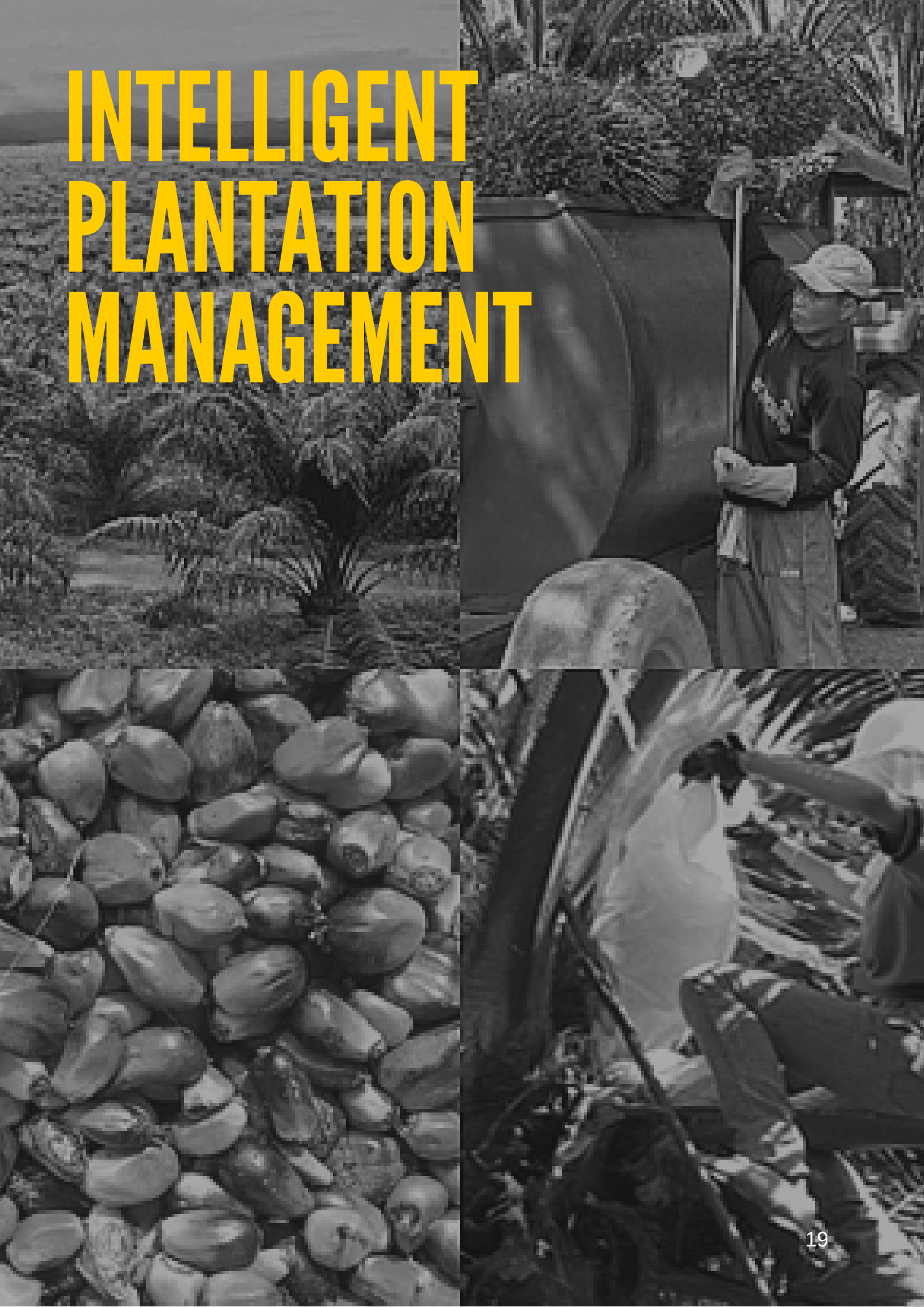
## **Improved Operations and Resource Allocation**

- In-depth predictive and prescriptive analytics allow for better operations projection.
- Optimum resource allocation and utilisation to maximise the deployment of human capital.

## **Better Performance and Engagement to the Public**

- Allow public safety leaders to better manage and measure performance to ensure safety and order.
- Faster engagement and control by relevant authorities on incidents such as damaged public infrastructure and/or public disturbances.
- Raising national competitiveness through improved efficiency and interaction.

# INTELLIGENT PLANTATION MANAGEMENT







Credits: [www.palmoil extraction machine.com](http://www.palmoil extraction machine.com), [wealthru property.com](http://wealthru property.com), [infinitymerchantsl.tradeindia.com](http://infinitymerchantsl.tradeindia.com), [www.agrostreet.com](http://www.agrostreet.com)

Malaysia's position as the world's leading palm oil country has allowed the industry to flourish in the way it has never been before. This results in the churning out of a wide variety of products through continuous R&D efforts. With the escalation in the volume of palm oil products and the fruit itself, it becomes necessary to produce high quality seedlings from high yield trees by automating and transforming the current process of pollination to meet growing demands.

The current methods of pollination involve tacit knowledge of checking whether a palm is suitable for pollination and manual labour being deployed in fields of vast sizes spanning over thousands of hectares in the nation itself. The drawbacks of such a system is late bagging during the pollination process that ultimately impacts overall yield and the process, being labour dependent, relies on a sizeable number of foreign manpower to work the fields.

# Challenge

Current pollination processes for oil palm pollination rely heavily on human dependence. It involves manual checking of trees for pollination readiness and is more of a guessing game rather than an exact science. For the process of oil palm pollination to be efficient and cost-effective, a logical solution would be to automate the process and reduce dependence on human tacit knowledge by transferring it into a system. The current gaps are:

- Human dependence to monitor trees for within the plantation and determine readiness for pollination.
- Inaccurate human-based decision making based on the determining of the pollination window.
- Vast plantation areas to be monitored to catch the pollination window to maximise yield.

## CURRENT GAPS

- Human dependence to monitor plantation
- Inaccurate human-based decision making
- Vast plantation areas to be monitored

## INTELLIGENT PLANTATION MANAGEMENT SOLUTION

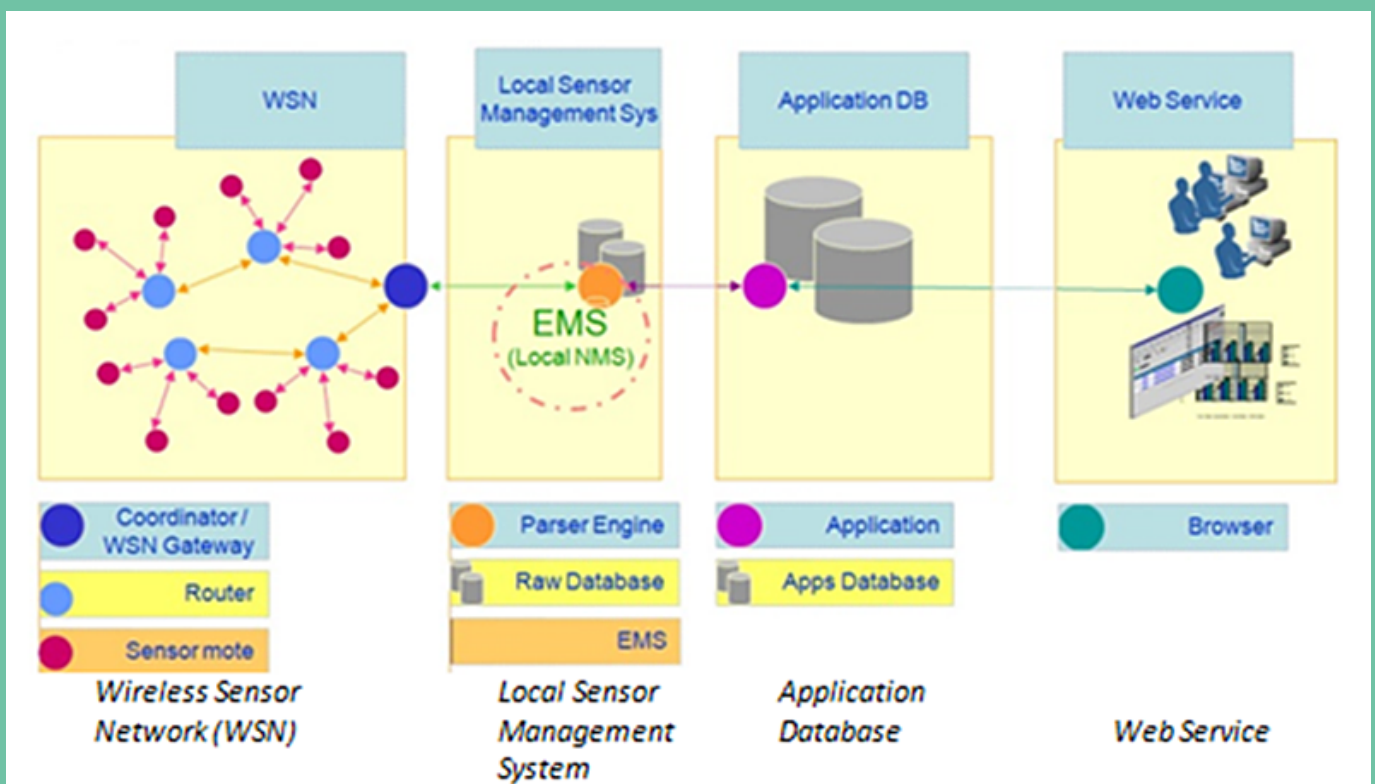
- Robust wireless network system
- Sensor system to monitor 'mother' palm
- Decision support system to process data and accurately determine pollination cycle
- Intelligent dashboard pinpoint trees' readiness for pollination

# Solution

MIMOS' Intelligent Plantation Management Solution provides an intelligent method to manage vast areas of oil palm plantations. It allows plantation managers to remotely check on the overall pollination status of their palms and triggering them once ready for pollination. Upon this, workers be deployed to the field to carry out the necessary processes and effort is not wasted to check on palms which may have passed or have not come arrived at the pollination window.

The solution consists of:

- Robust wireless network system that provides coverage the plantation area.
- Sensor system installed on each flowering 'mother' palm.
- Decision support system to process the data and accurately determine the pollination cycle.
- Intelligent dashboard to pinpoint the trees' readiness for pollination in the plantation.



Intelligent Plantation Management Solution

# Solution Highlights

- **Wireless Sensor Network**

A sensor network located at oil palm sites consists of nano temperature sensors, repeaters/routers and wireless gateways. The sensors are fixed to the centre of a 'mother' palm and transmits data to the gateway which then transmits to a regular telecommunications network.

- **Sensor Management System**

The sensors sense the palms' readiness for pollination through changes in the 'mother' palm's temperature and the status of the sensor whether transmitting or functioning will be tracked on a management system.

- **Central Application Database**

The central database server records all sensor data from the oil palm site and filters and structures the information. The information is then visualised in the form of charts and indicators for system users.

- **Mobile Web Services**

Mobile web services receive trigger alerts from the system when the pollination window opens for a 'mother' palm as well as enables the user to see the status of the other palms.

# Impact

## **Efficient Knowledge-Based Pollination**

- Reduction on dependency on human tacit human knowledge to scientifically determine the pollination window.
- Precisely pinpoint the exact 'mother' palm that is ready for pollination to reduce the number of visits by workers to palms.

## **Improved in Yield and Reduction in Fall Out**

- Fall out rate has the potential to be reduced as a result of identifying the right time to pollinate.
- The increase in sellable seedlings from the annual fruit bunch when the palm is accurately pollinated.

## **Efficient and Remote Operations**

- Ability to remotely monitor palm oil sites rain or shine through smart mobile applications.
- Effective deployment of personnel to the plantation and precision sensing of pollination readiness.





# MIMOS

Drawing from MIMOS' experience of more than 30 years in R&D in ICT, industrial electronics and nano-semiconductors with a core of over 700 researchers and scientists producing world-class design and R&D, a plethora of technologies with more than 900 patents filed to-date is now in motion to spearhead the proliferation of next-generation systems.

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