Integrated Safety Monitoring System

(An Improved Way to Manage Safety, Risk & Compliance)

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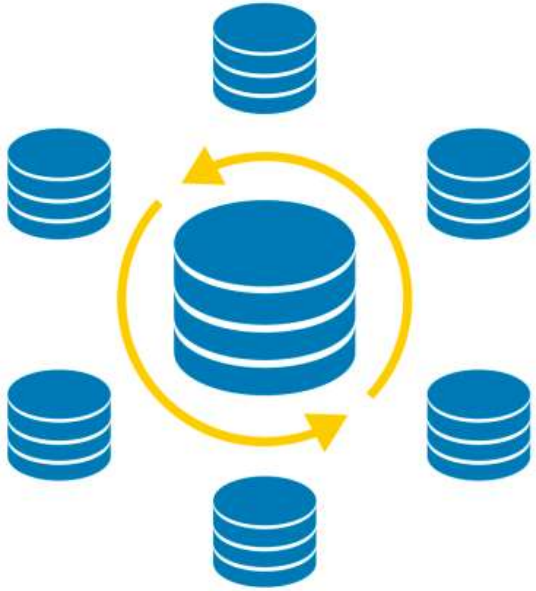
Refinery Present Set-up

Data Rich



Data in Process Historians, Manufacturing & IT Systems

Information Poor

Manual Analysis in Spreadsheets

Long Time to Insight

Inflexible, Static Reports

Existing deficiencies..

We lack

- Transparency
- Coordination
- Activity Planning
- Futuristic prediction
- Handy Information
- KPI driven initiatives
- Doc. Digitalisation
- Analytics

Proposed Strategy

Proposed Strategy

- Data Analytics
- Feasible IOT Solutions
- AI Applications
- VR & AR Solutions

Technology

Data analytics

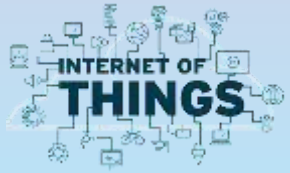
AI

Machine Learning

Virtual Reality

Augmented Reality

Digital Twin



Internet of Thing

RFID system

Video/Image Analytics

INTEGRATED SAFETY MONITORING SYSTEM

(An Improved Way to Manage Safety, Risk & Compliance)

Idea Brief	Interactive dashboard for dynamic monitoring of Fire alarm system, work permit/JSA, vehicle tracking	**Category**	Safety
		Topic	Strengthened Safety
Genesis of Idea	▲ Awareness of ongoing work/activities (RT, movements) ▲ Improving Response time & Effective coordination		
Details	Development of high resolution map (incl. asset/layout). Interactive user interface integrating the following data: ◆ MCPs & Gas analyser, GPS enabled Vehicle track ◆ Permits & JSA/Check point, Manpower count		
Implementability	☑ Quick win ☑ Long term ☑ Horizontal Deployment	**Timeline**	Immediate – 6 months
Benefit	✓ Single Point Monitoring with Real-time data visibility ✓ Augmented Safety monitoring refinery wide	☐ Tangible ☐ Intangible ☑ Both ☐ One Time ☑ Recurring per Annum	
Investment	₹ 710 Lakh		

VR & AR Application

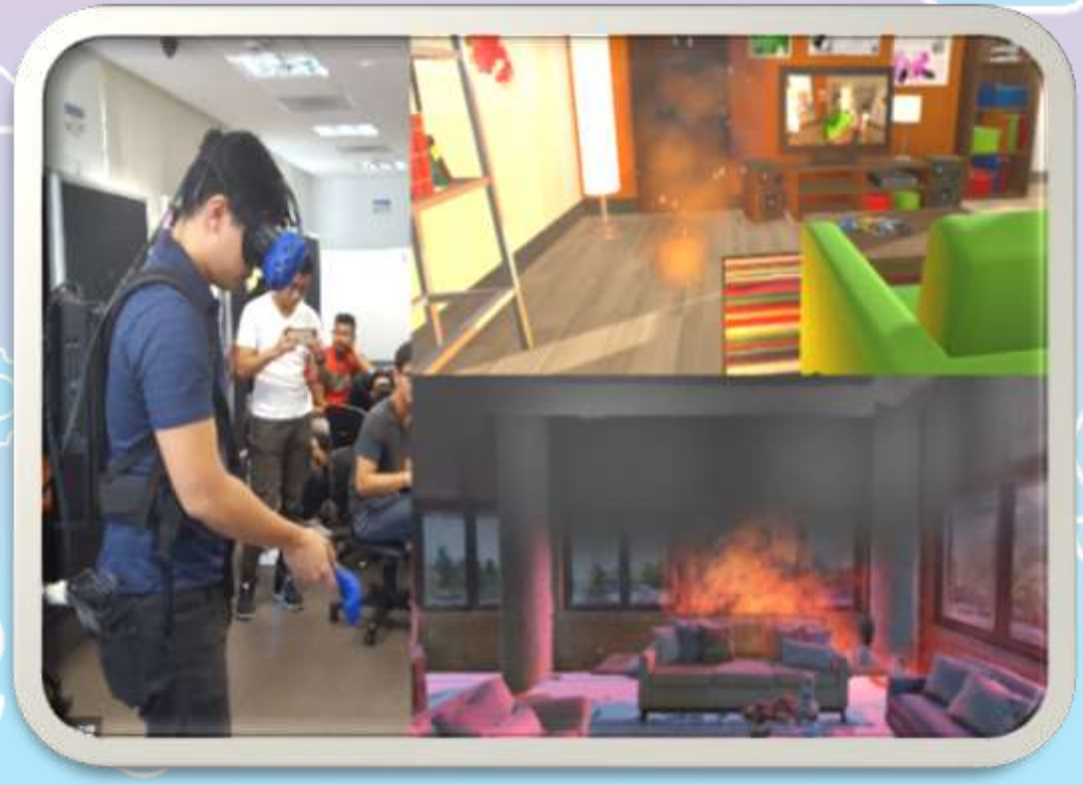
VR & AR Application

solutions in CPCL

VR & AR Application

- Virtual Reality for Safety Training
- Augmented Reality for Disaster Management

VR for Safety Training




PPE
SRL & Tag
PPE STATION
0/6
Wear your PPE:
1)High Vis Vest
2)Harness with lanyard
3)Helmet
4)Gloves
5)Goggles
6)Boots
Goto PPE
0/6
Goto SRL/Tag
0/2
Goto Platform


Thank
You

INTEGRATED SAFETY MONITORING SYSTEM

Genesis of Idea

- Increasing Response time & efficient Coordination during any incident
- Visualization of of Complete work permit scenario & Manpower involvement
- Awareness of ongoing / live activities (e.g. RT, Road blockages).
- Proper tracking of various movable Assets.
- Visualisation of Healthiness of various Fire & Safety Monitoring Tools

INTEGRATED SAFETY MONITORING SYSTEM

Details

MCPs | Gas Detectors | Fire water Net | Vehicle Movement | Manpower

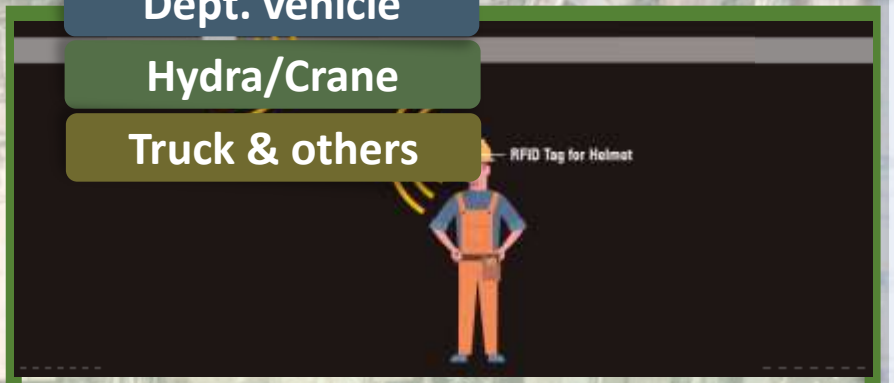
Work Permit | Radiography | Road Blockage | HVLR Automation

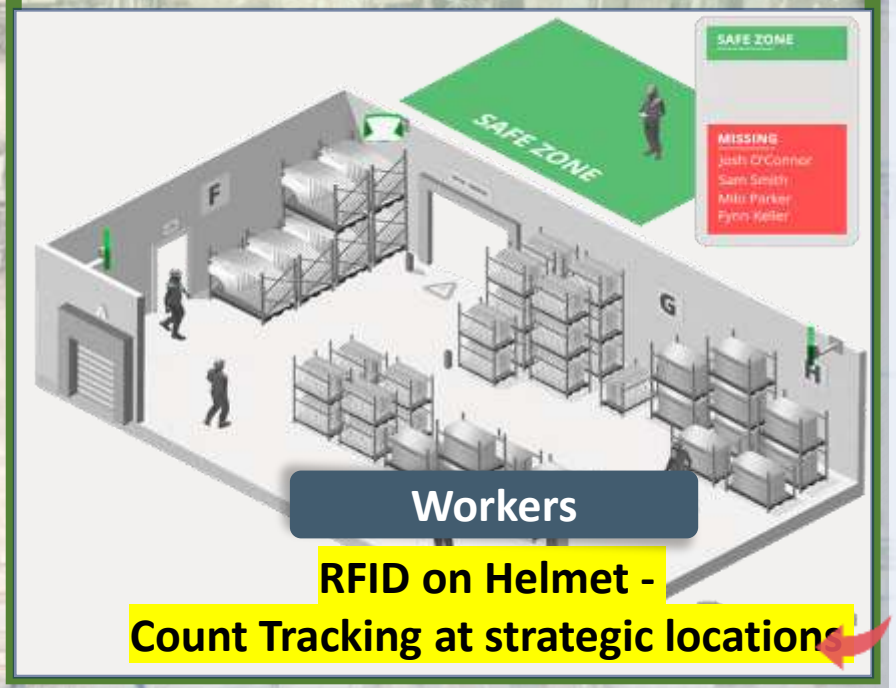
Fire Truck

Dept. vehicle

Hydra/Crane

Truck & others





Employees

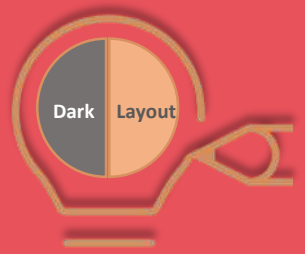
Smart Helmet –
GPS based, Gas sensors, SOS, Audible Alert sys.

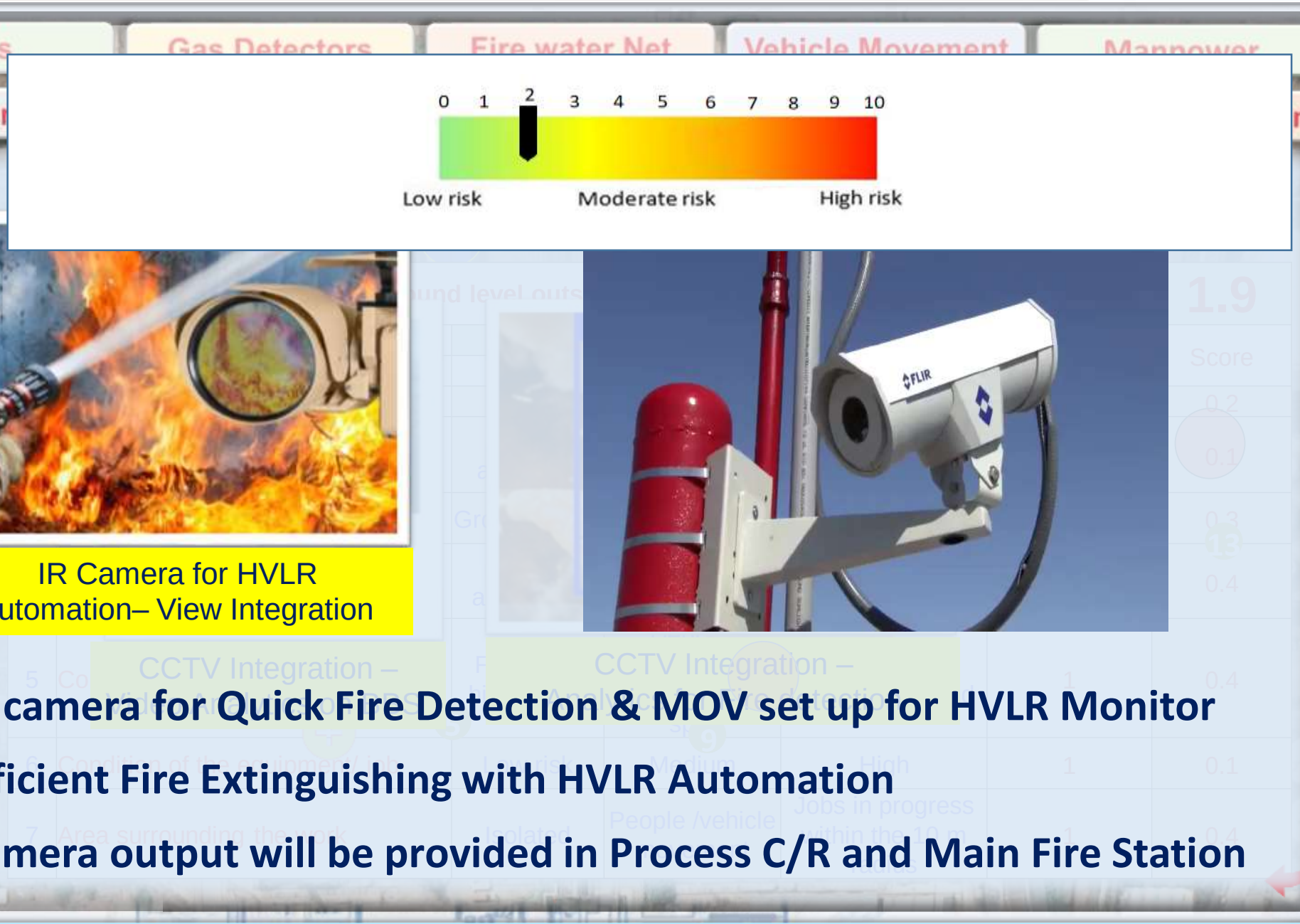
Workers

RFID on Helmet -
Count Tracking at strategic locations

INTEGRATED SAFETY MONITORING SYSTEM

Details





- **IR camera for Quick Fire Detection & MOV set up for HVLR Monitor**
- **Efficient Fire Extinguishing with HVLR Automation**
- **Camera output will be provided in Process C/R and Main Fire Station**

INTEGRATED SAFETY MONITORING SYSTEM

Benefit

- ✓ Single Point Monitoring for all Safety Elements
- ✓ Revamped Safety integrating various aspects
- ✓ Real time Visibility & instant Reporting of all types activity to all
- ✓ Effective Coordination & utilization of various assets
- ✓ More safety Consciousness, Confidence & Productivity Booster

Digital Safety Wall

Single Point Integral Safety Monitoring in Refinery Units

INTEGRATED SAFETY MONITORING SYSTEM

Investment & Cost Saving

In Lakh

Quick Win Activities		Investment	Timeline
1	High resolution layout/map survey of the Refinery	20	1 month
2	Development of Dashboard Integrating Permit system	50	3 months
3	MCP data Integration into Dashboard	30	1 month
4	Historian Data integration for HC Gas Analyzers/Fire water network	10	1 month
5	CCTV/Analytic Software integration into Dashboard	20	3 months
	TOTAL	130	

IOT Adoption & Integration into Dashboard		Investment	Timeline
6	GPS tracker for vehicles (300 nos. apprx) & Fleet system Integration	80	2 months
7	Smart Helmet for Employees (500 nos. apprx)	100	3 months
8	Helmet with RFID for workers (1000 nos. apprx)	50	3 months
9	Intrinsically Mobile/Tab device (100 nos. apprx)	200	3 months
10	IR camera set up for Automation of HVLR (for 10 Installation)	150	6 months
	TOTAL	580	

Safety Score in Work permit system

Details

Sample Job - **Pipe welding inside pipe-rack outside Battery Limit**					**Risk Score**	**5.2**
	RISK CATEGORY	LOW	MEDIUM	HIGH	WEIGHTAGE	Score
	Proposed scores	0.5	2	5		
1	Nature of the work	Routine	Shutdown	Construction	2	2
2	Approachability to the work area	Easy approach	Difficult approach	No approach (to be approached with additional aids)	1	0.4
3	Height of the work spot	Ground Level	2-5 m	More than 5 m	3	1.2
4	Vehicle Entry Details	Not applicable	Vehicle entry for materials	Crane entry at work spot	1	1
5	Condition of the work area	Free from hindrances	Debris / materials around work spot	Oil/chemical Hazard surround	1	0.4
6	Condition of the equipment/ job	Low risk	Medium	High	1	0.1
7	Area surrounding the work	Isolated	People /vehicle movement	Jobs in progress within the 10 m radius	1	0.1

Safety Score in Work permit system

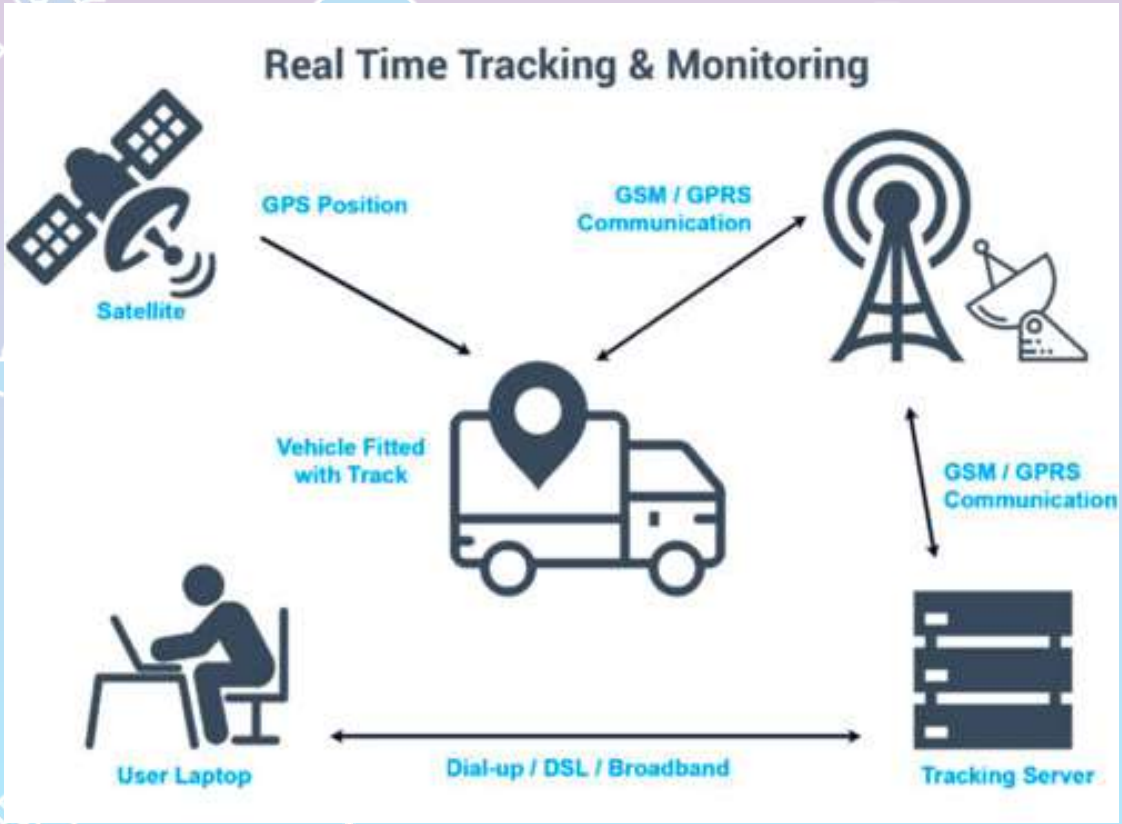
Details

Sample Job - **Hot works inside pipe-rack inside battery limit of the plant during emergency shutdown**					**Risk Score**	**8.8**
	RISK CATEGORY	LOW	MEDIUM	HIGH	WEIGHTAGE	Score
	Proposed scores	5	2	0.5		
1	Nature of the work	Routine	Shutdown	Construction	2	0.8
2	Approachability to the work area	Easy approach	Difficult approach	No approach (to be approached with additional aids)	1	1
3	Height of the work spot	Ground Level	2-5 m	More than 5 m	3	3
4	Vehicle Entry Details	Not applicable	Vehicle entry for materials	Crane entry at work spot	1	1
5	Condition of the work area	Free from hindrances	Debris / materials around work spot	Oil/chemical Hazard surround	1	1
6	Condition of the equipment/ job	Low risk	Medium	High	1	1
7	Area surrounding the work	Isolated	People /vehicle movement	Jobs in progress within the 10 m radius	1	1

Smart Helmets

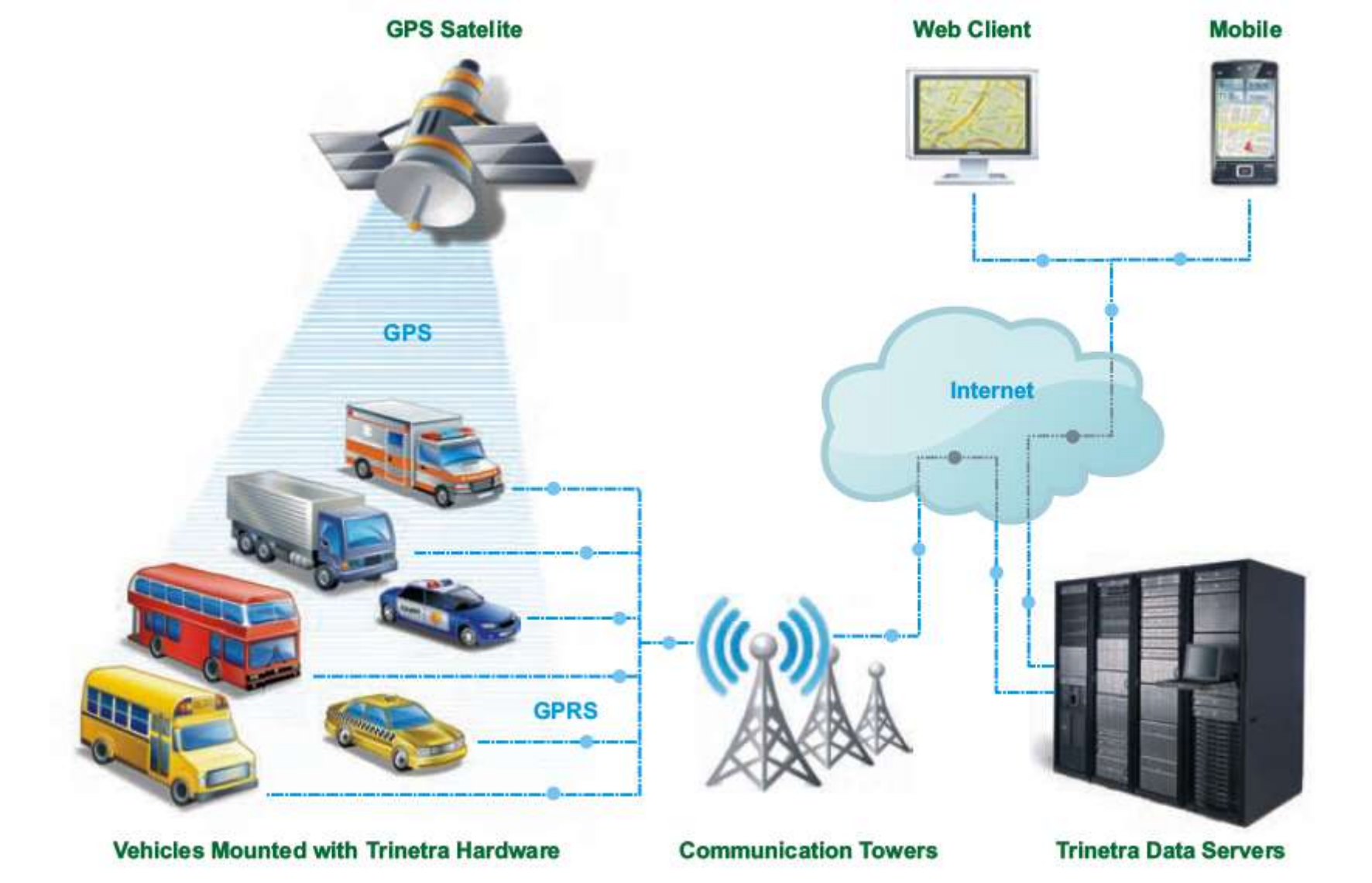
M/s Excellent webworld - Vadodara

GPS Tracking of Assets

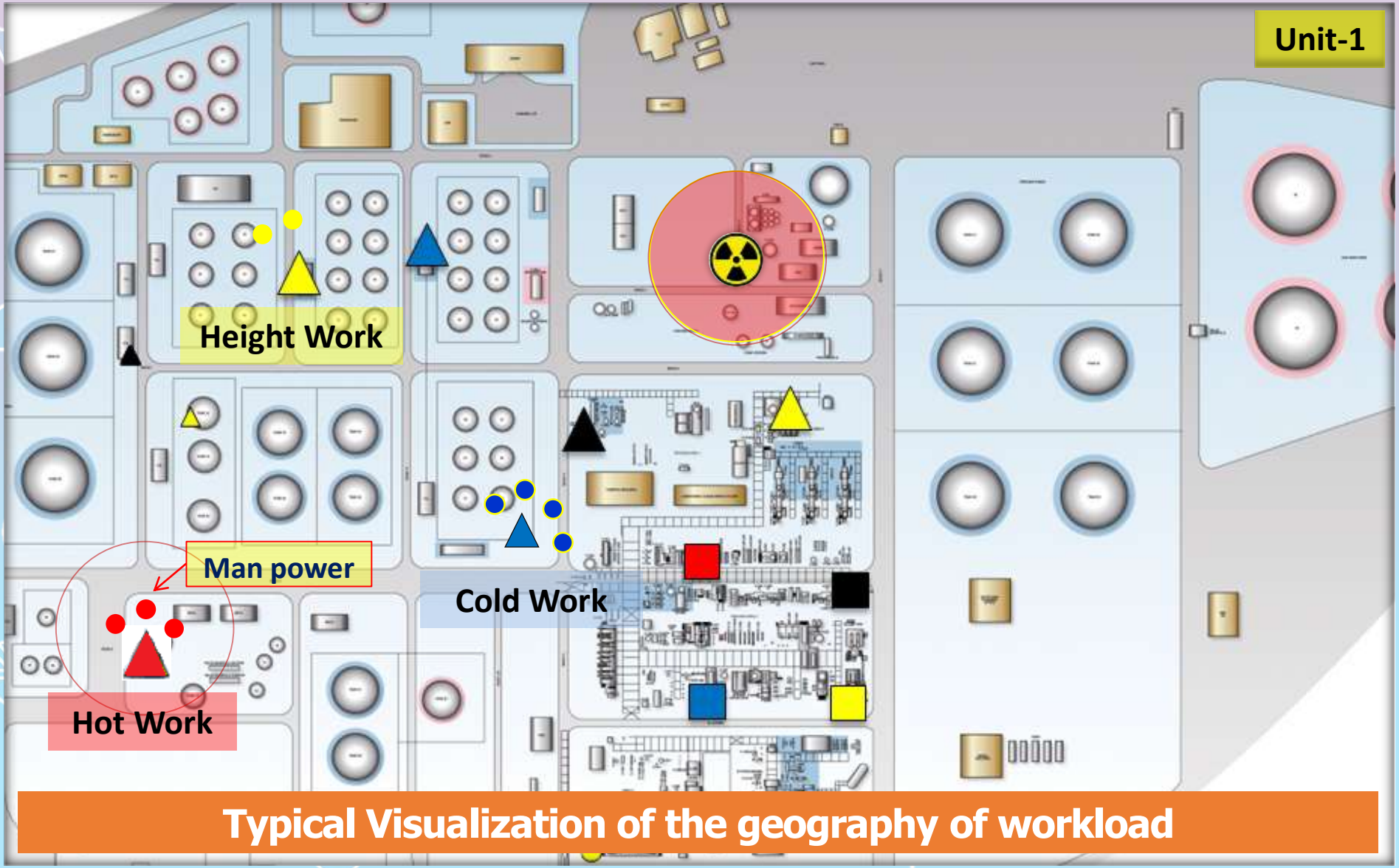


M/s Trinetra Fleet Management

GPS Tracking of Assets



Work Permit & Work Load



Typical Visualization of the geography of workload

Cordon Off Distance Calculation:

The dose rate of different some common radiography isotopes are as follows:

1. Ir-192: Dose rate = 0.5 R/Ci/m/hr
2. Se-75: Dose rate = 0.203 R/Ci/m/hr
3. Co-60: Dose rate = 1.3 R/Ci/m/hr

Prescribed radiation level along the cordon-off area, P = 2 mR/hr = 0.002R/hr = 0.336 R/week

Source used: Ir-192 ; Strength of the source : 10 Ci ; Working Hours: 8 Hours per day and 5 days per week. Consider the occupancy as office.

Solution:

Work Load = 0.5 X 10 X (6 X 5) = 150

Cordon-Off distance : d=√(150 X 1 /0.336) = 22.82mt ~ 25 mt