# Pune smart city

**Presentation on Integrated Command Control Centre**
**Sep 22, 2017**

**PUNE SMART CITY OPERATIONS CENTRE**

**By CEO, PSCDCL**
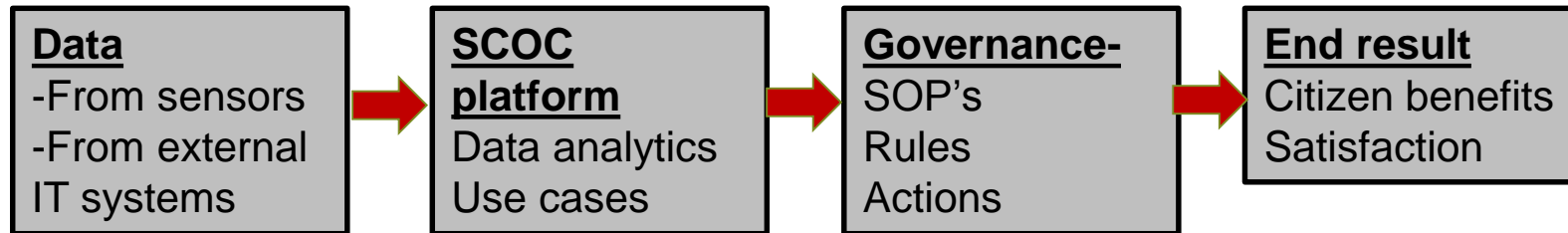**Dr. Rajendra Jagtap, IDES**

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# SCOC – Concept at SCP stage

**Heightened citizen satisfaction through improved governance leveraging data and analytics**

| **Data**<br>-From sensors<br>-From external<br>IT systems | → | **SCOC platform**<br>Data analytics<br>Use cases | → | **Governance-**<br>SOP's<br>Rules<br>Actions | → | **End result**<br>Citizen benefits<br>Satisfaction |

As proposed in Smart city proposal, SPV's responsibility was to establish Integrated Command and Control Centre with –

➢Sensor

➢Communication network

➢City platform

As a result of PSCDCL's initiative, the objectives of improved citizen satisfaction will be achieved by deployment of sensors (environmental, flood), Communication network, city platform and other external IT systems.

Additionally PSCDCL introduced safety aspects into project being citizen's main priority by deployment of emergency call system, PA system and messaging systems for citizen information.

# *Smart Element* project Overview

## 6 key elements to be created as a part of Smart Element

| | |
|---|---|
| **Smart City Operations Center** | ▪ **State of art Command and Control Centre** which will seamlessly integrate with all elements to monitor & manage entire city operations from single Command Centre. |
| **Wi-Fi** | ▪ **200+ Wi-Fi hotspots to be created across strategic locations** including parks, hospitals, other important public spaces. Limited free access to citizens supporting digital transformation. |
| **Environment Sensors** | ▪ **50+ Environmental monitoring systems at various locations** to monitor critical parameters across temperature, air quality pollution etc. |
| **PA System** | ▪ **125+ Public announcement system** at key locations to broadcast general and emergency messages for public awareness |
| **Emergency box** | ▪ **Emergency response system** for citizen safety, to seek help in case of emergency situations and accidents |
| **Variable messaging** | ▪ **150+ Variable Message System** for broadcasting informative messages, alerts and city updates |

# Wi Fi system overview

- Total no. of Wi Fi Hotspots in Scope: 199

- Completion till 16th Sep. 2017: 143

- Work in Progress: 56 (TBC: Nov-Dec, 2017)

### Below picture's showcase Wi-Fi Installation



**Key Highlights:**
- Assured minimum 512 Kbps speed per user
- Free and secure access to user for first 30 minutes / 50 MB
- Indoor / Outdoor locations selected on basis of high-footfall – Gardens, key tourist attractions, bus stands etc.
- Sensor Make & Model – Cisco 1560, 2700
- SOPs are being finalized

**Monitoring Mechanism:**
- Dashboard to monitor revenue stream (WIP)
- Centralized NMS at ICC to monitor field elements

**Technical Specifications:**
- Field level PoE switches to connect APs
- Wireless controller to control and manage Wi-Fi Access points

# Variable message displays (VMDs) - overview

> ➤ Total no. of VMDs in Scope: 161
>
> ➤ Completion till 16th Sep. 2017: 48
>
> ➤ Work in Progress: 113 (TBC – Nov-Dec, 2017)

**Below picture showcase VMD Installation**



**Key Highlights:**
- ➤ Communicate effectively with the citizens and to improve response time in case of emergency
- ➤ Informative tool to connect with the citizen
- ➤ Display messages can be centrally controlled through ICC
- ➤ Make – 3M
- ➤ SOPs are being finalized

**Monitoring Mechanism:**
- ➤ Dashboard to monitor revenue stream
- ➤ Centralized IOC system to control and monitor the VMDs display

**Technical Specifications:**
- ➤ Multilingual
- ➤ 100 % anti-glare
- ➤ Minimum 60 GB storage
- ➤ Interface with GPRS or Ethernet

# Environmental sensors - overview

> Total no. of Environment Sensors in Scope: 50

> Completion till 16th Sep. 2017: 40

> Work in Progress: 10 (TBC: Oct, 2017)

**Below picture showcase Environmental Sensor Installation**



**Key Highlights:**
> Monitor critical parameters across temperature, air quality, etc.
> Sense prevailing environmental conditions and send the data to the integrated control system at ICC
> Display the captured information to the VMDs for citizens use
> Make – Bosch
> SOPs are being finalized

**Monitoring Mechanism:**
> Centralized ICC system to monitor the performance of the Environmental sensors

**Technical Specifications:**
> Response time: 120 sec
> USB/Ethernet connectivity
> Measurement component: NO2, CO2, CO, O3

# Flood sensors - Overview

➢ Total no. of Flood Sensors in Scope: 30

➢ Completion till 16th Sep. 2017: 30

➢ Work Completed

**Below picture showcase Flood Sensor Installation**



**Key Highlights:**
➢ Water level monitoring at low lying areas in the city
➢ Detection of water levels at major river junctions (Alert level and Danger level)
➢ Near real time water levels information to the citizens through SMS, VMDs
➢ Make – Spatika/Varsha
➢ SOPs are being finalized

**Monitoring Mechanism:**
➢ Near real time monitoring mechanism
➢ Integration with the ICC to monitor the deployed field elements

**Technical Specifications:**
➢ Sensor type: Ultrasonic
➢ Range: 60cm to 15m
➢ Microprocessor based data acquisition and storage system

# Emergency call box system - overview

> ➤ Total no. of Smart Elements in Scope: 136
>
> ➤ Completion till 16th Sep. 2017: 77
>
> ➤ Work in progress on: 59 (TBC: Nov-Dec, 2017)

**Below picture showcase Emergency Call Box Installation**



**Key Highlights:**

➤ Deployed for citizen safety, to seek help in case of emergency situations and accidents

➤ Enable citizens to establish a two way communication (through camera & audio speaker) with the ICC, police station and other civil bodies

➤ In-built color camera with night mode facility to capture key incidents

➤ Make – Commend

➤ SOPs are being finalized

**Monitoring Mechanism:**

➤ Control software at ICC to control/monitor the system

**Technical Specifications:**

➤ 3G/4G/Ethernet connectivity

➤ IP-65 rated

➤ VOIP Phone, Hands-free calling, Watertight

# PA system overview

> - Total no. of Smart Elements in Scope: 136
>
> - Completion till 16th Sep. 2017: 77
>
> - Work in progress on: 59 (TBC: Nov-Dec, 2017)

**Below picture showcase Public Address System Installation**



Enable civic bodies to communicate effectively in emergency

**Key Highlights:**
- Deployed at key locations to broadcast general and emergency messages for public awareness
- System can deliver pre-recorded and live messages
- 200 watts PA amplifier along with speakers
- Specific announcement can be possible for single zone / multi zone operations
- Near real time information to the citizens from ICC

**Monitoring Mechanism:**
- Control software at ICC to control/monitor all the components of the system includes controller, amplifier, calling station

**Technical Specifications:**
- Automatic on/off operations
- IP-65 rated
- Access control mechanism

# Smart Element and overall architecture
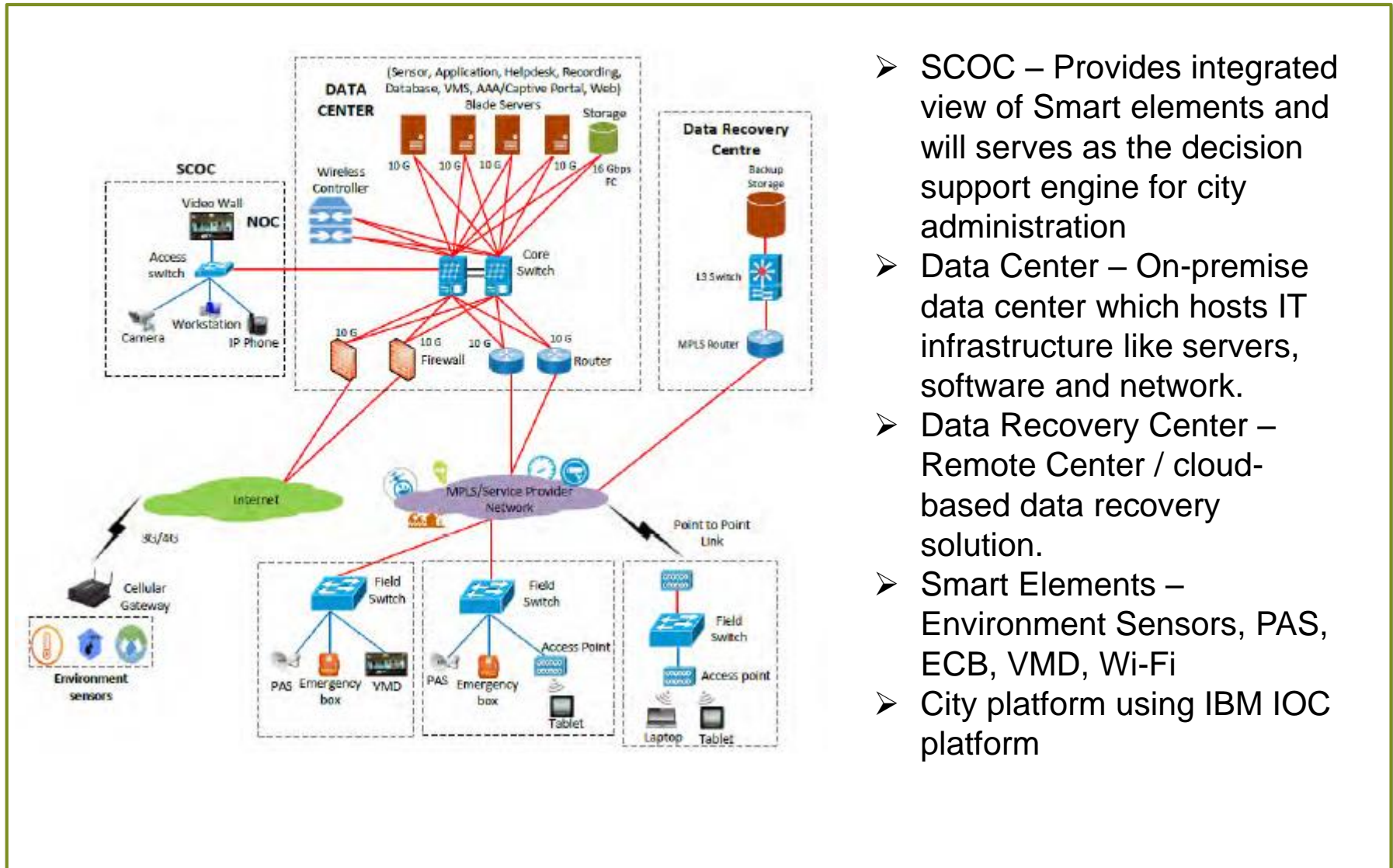


- ➤ SCOC – Provides integrated view of Smart elements and will serves as the decision support engine for city administration
- ➤ Data Center – On-premise data center which hosts IT infrastructure like servers, software and network.
- ➤ Data Recovery Center – Remote Center / cloud-based data recovery solution.
- ➤ Smart Elements – Environment Sensors, PAS, ECB, VMD, Wi-Fi
- ➤ City platform using IBM IOC platform

# SCOC details - Architecture
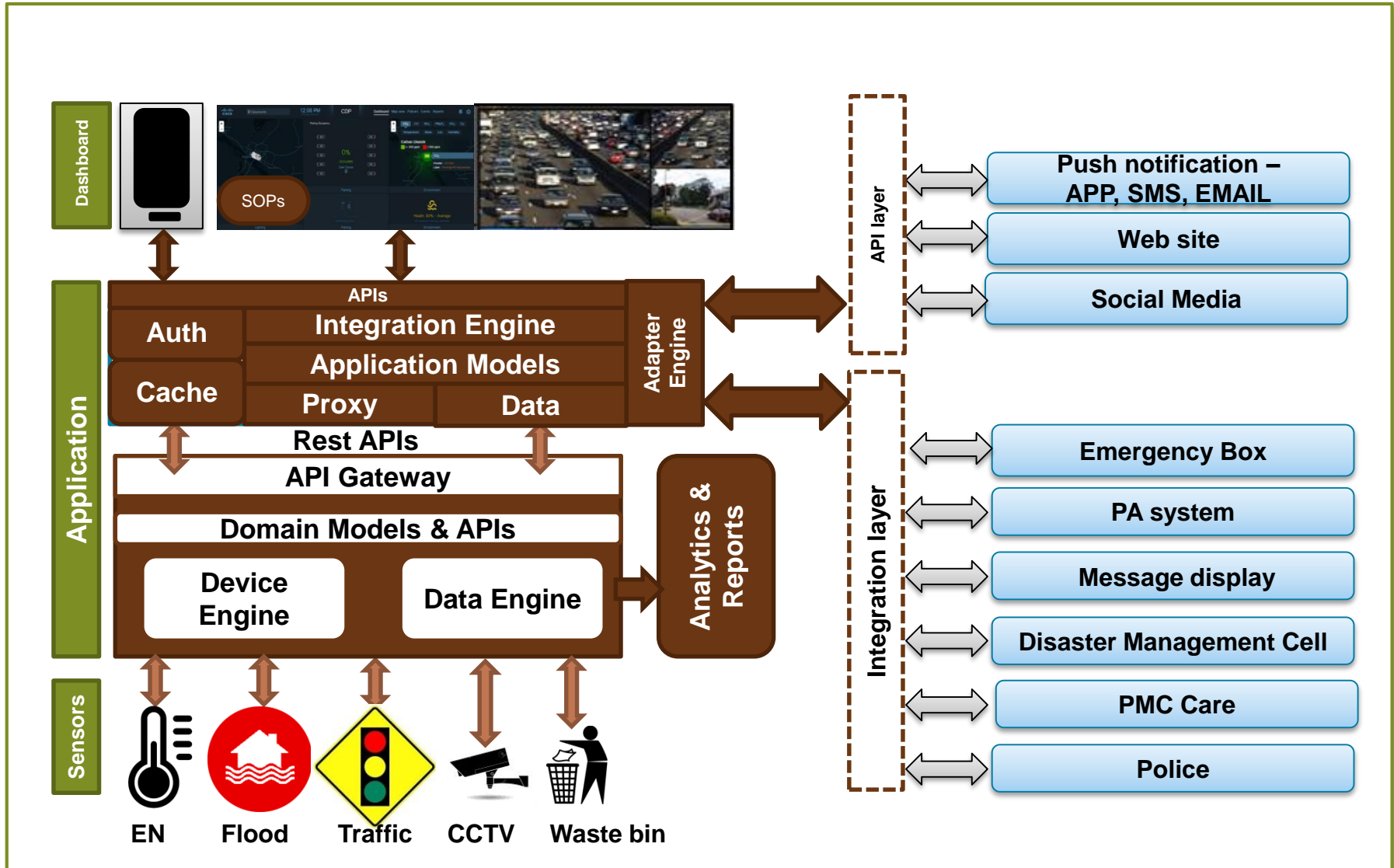
# SCOC details - infrastructure
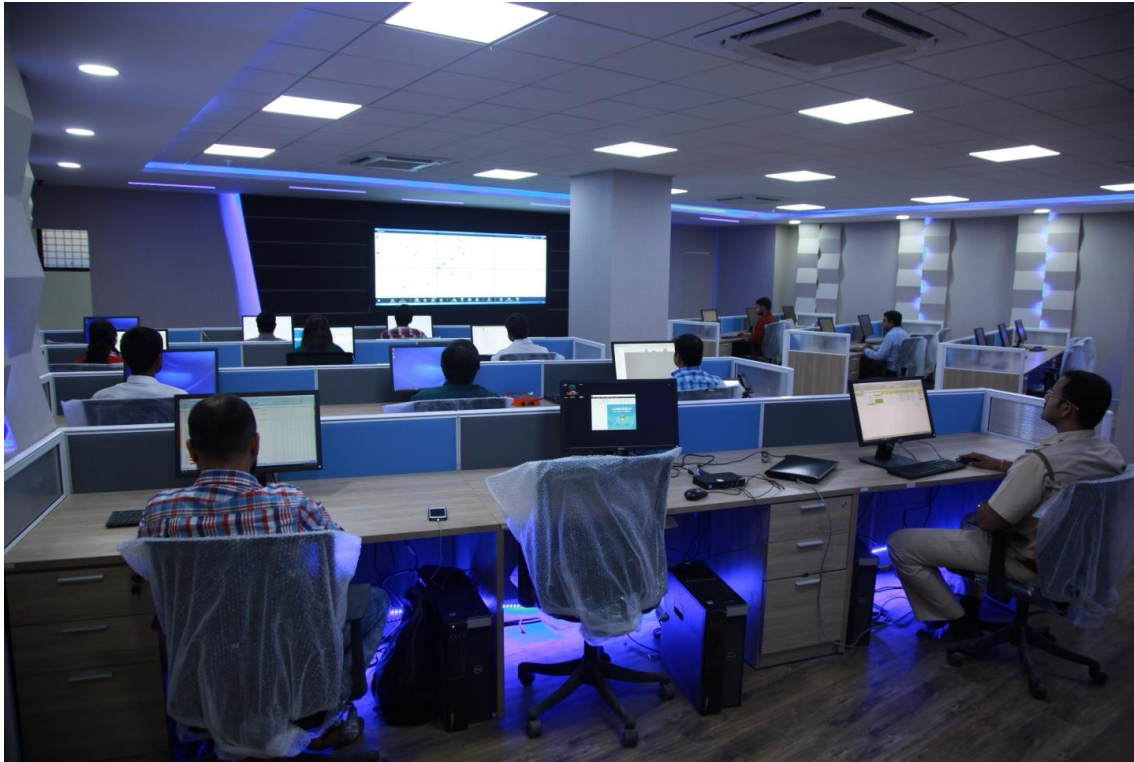


**24 X 7 power back up by DG sets and automatic changeover for seamless operations.**

**Highlights:**

- **24 seating capacity**

- **Ergonomically designed interior**

- **Comfort systems for continuous operations**

- **High speed data connectivity**

- **State-of-the-art Video wall for broader view and collaboration**

- **Data Centre and UPS rooms**

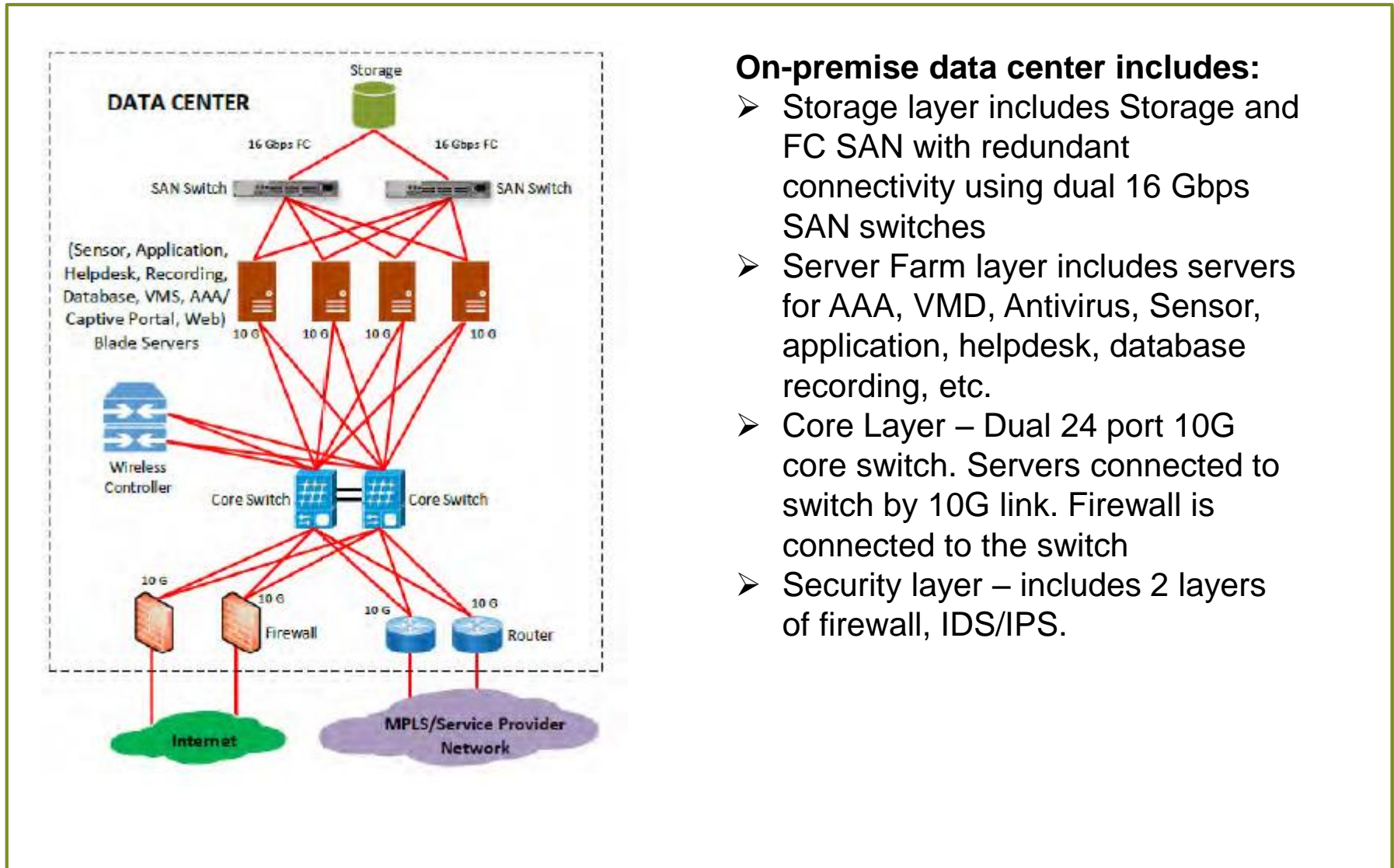- **Facility of conference room, citizen gallery and maintenance teams**

# SCOC details – Work station software

**Video wall showing city-wide environmental sensors status –**
**Enabled by selecting sensor filter option in the menu.**
**(in similar way each sensor type can be filtered)**
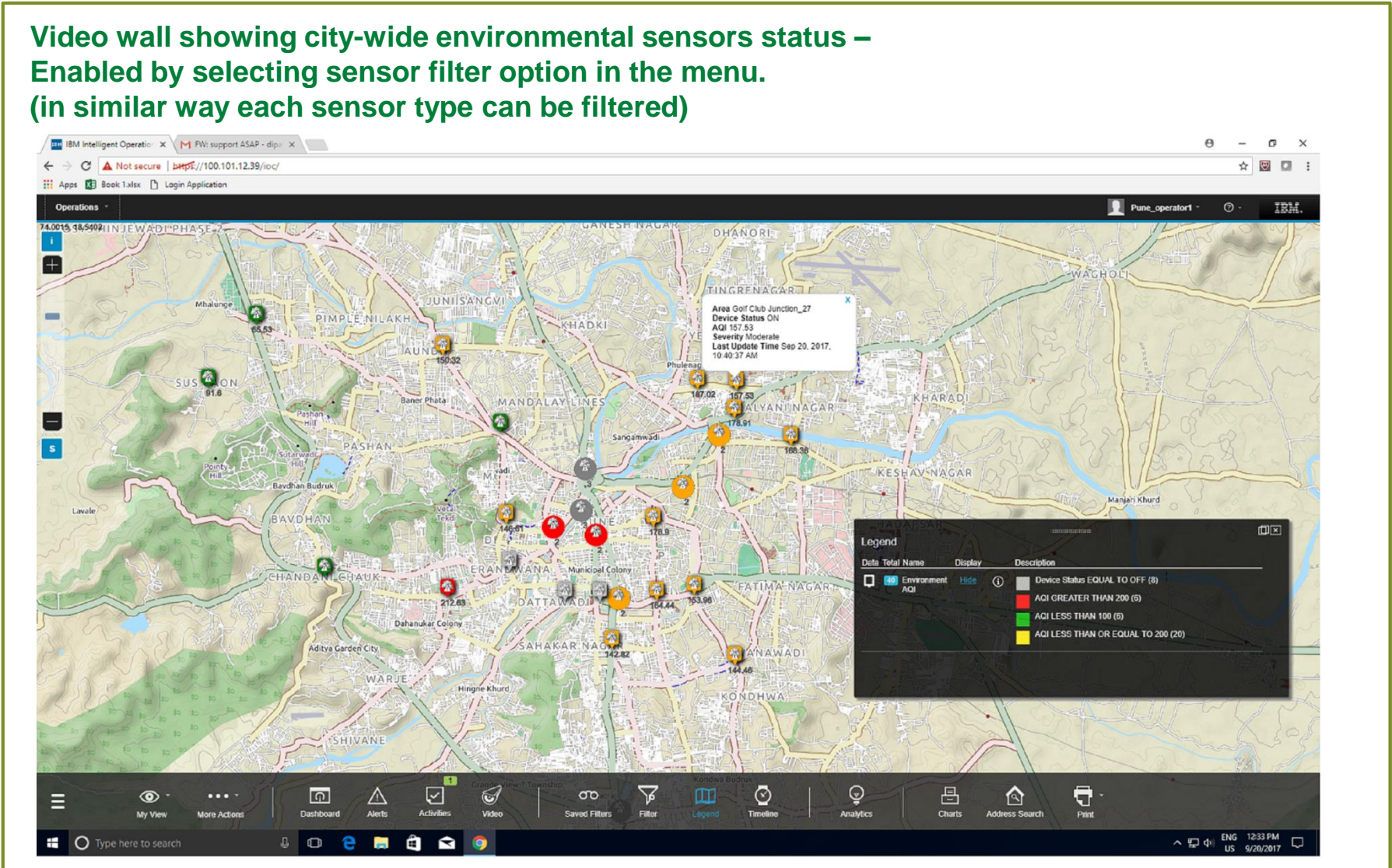
# Data Centre overview



**On-premise data center includes:**

➤ Storage layer includes Storage and FC SAN with redundant connectivity using dual 16 Gbps SAN switches

➤ Server Farm layer includes servers for AAA, VMD, Antivirus, Sensor, application, helpdesk, database recording, etc.

➤ Core Layer – Dual 24 port 10G core switch. Servers connected to switch by 10G link. Firewall is connected to the switch

➤ Security layer – includes 2 layers of firewall, IDS/IPS.

# Financial Model & Revenue of the project

## Model:
- Bids were invited with CAPEX, OPEX and REVENUE.
- Bidders were evaluated on basis of QCBS (80-20)
- The contract was awarded to L&T with Railtel as consortium partner

## Operations & Maintenance
- Covers operations and field maintenance
- Contract has provision of SLA's to keep system functional
- SLA's are linked with quarterly payments during O&M duration

## Revenue
- Revenue from Wi Fi streams and VMD streams are included and will be adjusted in quarterly payment
- Minimum guaranteed revenue is committed by the bidder
- Contract provision for revenue sharing for any new stream or initiative as emerges during 5 years of O&M period

# Use Case: Flood Alert under implementation

**Pune has deployed flood alert sensors at key points around the city. The SCOC will receive alerts and will send messages to VMDs within a programmed radius, and notify key city agencies (monitoring on alert and danger levels)**
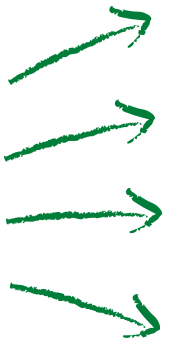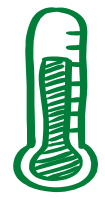
**Post awareness message to VMD (auto)**

**Post alert message to twitter, citizen app/portal or social media (same as before)**

**Alert Disaster management of dangerous environmental conditions (manual)**

**Alert SINCHIN Dept, Irrigation Dept, Police (manual)**
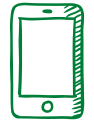
Flood alert Sensors send water levels to SCOC

SCOC receives alert information and identifies VMDs/PAs for pushing information.

Flood alerts will be sent to VMDs/PAs automatically as well as manually.

Relevant SOPs will be triggered at SCOC

# What next?

## Use case roadmap - Smart Elements to integrate with external systems

**External IT systems & departments**

Street lights

Disaster Management network

Pollution Control Board system

Police dial 100

Dam authority portal

Irrigation department portal

Road works app & portal

What happens when all elements in a city co-operate with other IT systesm?

**……The City Becomes SMARTER!**

Variable Message Displays

Public Address System
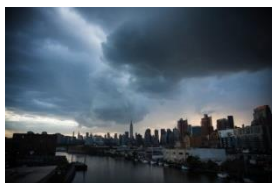
Environmental & flood sensors

City Wi-Fi

Emergency Call Box

# Use case roadmap – Planned use cases

**Ambient light sensor used to control the street light**

On cloudy or rainy days, the environmental sensors may detect low light scenario. In those situations, the SCOC will post messages on VMDs for drivers to turn on headlights, and send a message to switch on the streetlights.

**Post VMD message to turn on head lamps (auto)**

**Switch on street lights to raise luminosity**
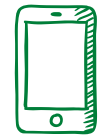
Environmental Sensors detect low visibility

The SCOC will identify VMDs and streetlights within a 2km radius.

Automated messages are sent to VMDs with messages to motorists, as well as a message to streetlights to increase luminosity.

# Integration of other command centers with SCOC



**Smart City Operations Centre**

**Highlights:**

- **Other dept users will be present in the SCOC for faster decision making**

- **External command control centers will be integrated in phase manner (master / slave configuration)**

- **External command control centers will continue to act and perform in same manner with full control**

- **SCOC platform is equipped with integration layer for data normalization – so as to accept any kind of raw data**

- **Meaningful analytics will be built using data sets at SCOC – these will act as decision support mechanism for the city.**

**Transport CCC**

**Traffic CCC**

**Smart light CCC**

**Solid waste CCC**

**Water SCADA CCC**

**Surveillance CCC**

# Road ahead …..

## Immediate horizon (Dec 2017)

- **All elements installed and integrated with SCOC**
- **Use cases using Smart elements and SCOC implemented**
- **Operations with SCOC staff**
- **Basic IT Security**

## Medium term plan (1st year)

- **Robust SLA monitoring**
- **Data security and safety auditing**
- **Other 3rd-party and departments' IT systems integration**
- **Other department staff operational from SCOC**
- **App, social media, portal integration**
- **End-to-end IT Infra and App Security**

## Long-term plan (2 years)

- **Open data policy**
- **NDA for data sharing**
- **City data exchange**
- **Analytics and holistic city dashboard**
- **Remote operations**
- **Cyber Security**

**By 2019**

**By 2018**

**By Dec 2017**

# Thank you…..

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