Asset Management-Roads / Highways
Integrated Road Asset Management System-IRAMS

Abhay Kimmatkar
Jt. Managing Director
SUBSIDIARIES
ADCC Infocom Pvt. Ltd. | ADCC International East Africa Limited | ADCC Geosys West Africa Limited
ADCC Technology Zambia Limited | ADCC Academy Pvt. Ltd. | AI Instrumentation Pvt. Ltd.

CORPORATE OFFICE
Nagpur

GIS CENTERS
Nagpur | Mumbai | Hyderabad | Lucknow

DOMESTIC OFFICES
Mumbai | Pune | Hyderabad
Lucknow | Ahmedabad

INTERNATIONAL OFFICES
Nairobi (Kenya) | Accra (Ghana)
Windhoek (Namibia) | Lusaka (Zambia)
GEOGRAPHICAL INFORMATION SYSTEM
• Cadastral Mapping
• Utility GIS – Gas, Water, Electrical, Telecom
• Municipal GIS
• 3D GIS-LiDAR, Photogrammetry
• Navigation • Imagery Solutions-Digital Globe
  (facilitator for DG)

ENERGY SYSTEMS & SERVICES
• Managed Data Services
• AMI/ SCADA Solution
• Infra Projects

SMART
• E-Governance – BPAS | TDR | ERP
• 3D City Modeling
• Smart - Grid | Wi-Fi |
  Surveillance | Parking |
  Street Lighting

SOFTWARE DEVELOPMENT
• Application: Desktop | Web GIS |
  Mobile
• MIS
• Web Design & Development.
• Design & Animation
  (Digital Marketing/ SEO)

INDUSTRIAL SOFTWARE SOLUTION

EDUCATION SOFTWARE SOLUTION

ADCC ACADEMY PVT. LTD.
**ADCC’s SOLUTIONS**

**Smart Water:** 24 x 7 water supply, Smart Metering and WQM

**Smart GRID:** SCADA Solutions, R-APDRP, MDS, Infra, GIS Solutions.

**3D Spatial Data (Web GIS):** DGPS, ETS, Photogrammetry, Lidar, 3D Building, Modeling, Web GIS LBS, RAMS

**E-Office:** BPAS, TDR, PLO, ERP, WFM, DMS

**Smart Sensors:** Smart Wi-Fi, Smart Parking, Smart Surveillance, Smart Street Lighting, etc.

**Master System Integrator:** Intelligent Operational Centre, Citizen App, Hard Infrastructure & Soft Infrastructure
Many definitions of Road / Highway Asset Management

“Asset management is a strategic approach that identifies the optimal allocation of resources for the management, operation, preservation and enhancement of the highway infrastructure to meet the needs of current and future customers.”

“A systematic process of maintaining, upgrading and operating assets, combining engineering principles with sound business practice and economic rationale, and providing tools to facilitate a more organised and flexible approach to making the decisions necessary to achieve the public’s expectations.”
Benefits of Asset Management

- Reduced life-cycle costs
- The ability to track performance
- Improved transparency in decision making
- More accurate forecasting of funding requirements
- Decreased financial, operational and legal risk
- Ability to discharge statutory valuation and financial reporting responsibilities
The 7 “What's” ... and basic processes

- What is the remaining service life?
- What is it worth?
- Where is it?
- What do you own?
- What is deferred?
- What do you fix first?
- What is the condition?

Data
- Performance modelling
- Alternative development
- Programme optimisation
- Project selection
- Implementation
- Monitoring / feedback

Goals
Policies
Budgets
Unified view of inventory is essential...

- location, both spatial (x.y) and along track (chainage)
- core characteristics and condition

...but quality of data has often been poor:

- based on historical, scheme and surveyed data
- drawn from disparate databases - structures, lighting, pavements, ITS, ...
- little / inconsistent quality control
- lack of user confidence in data
On a periodic basis as part of general quality control

To support tendering of large scale (maintenance) contracts

Prior to major works
Inventory Data Collection Methods

- **Walk**
  - measuring wheel & paper/PDA
  - GPS enabled tablets

- **Spatial Video**
  - multiple high rez cameras
  - sub 500 mm positioning
  - in-frame measurement
  - attempts at automatic pattern recognition in video

- **LiDAR**
  - high end mobile mapping
  - engineering and safety applications
Data Collection Methods – Manual Surveys

Advantages

- Rich dataset
- Quick (for small sections)
- Cost ... in some instances

Disadvantages

- Safety risk to staff, disruption to traffic
- Accuracy depending quality surveyor
- Quality control extremely difficult
- Slow and expensive for large networks
Data Collection Methods – Video Surveys

Advantages

- Verification / quality control
- Accuracy (500 mm in x/y; 100 mm for measurements)
- Safety and lack of traffic disruption
- Cost
- Secondary Applications in operations and maintenance

Disadvantages

- Asset must be in camera FOV
- Limited view of asset condition
Data Collection Methods – LiDAR Surveys

Advantages

- Highly accurate positioning (10 – 30 mm) and measurement (5-10 mm)
- Significant secondary applications in engineering and safety, eg:
  - construction drawings, as-builts
  - guardrail heights
  - sign / lane marking retro-reflectivity

Disadvantages

- Cost
- Data volumes
Integration with Asset Management Systems

... and export it to Asset Management and GIS systems
Components of Road Asset Management System
Architecture of Road Asset Management system
<table>
<thead>
<tr>
<th>Unique ID</th>
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<th>Area</th>
<th>Type of Repair</th>
<th>Contractor Details</th>
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SeeROAD FUNCTIONALITIES

• Current ROAD Status
  – Types of Deformations
  – No. of Potholes
• Planning and Monitoring
  – Change Analysis
• Integrated Contractor MIS
  – Contractor profile
  – Allocation of contract
• Citizen Participation
  – User (citizen) generated content
• Report Generation
  – Alert Management
TYPES OF DEFORMATIONS

- Reflection
- Crocodile
- Longitudinal
- Transverse
- Edge Break
- Patching
- Bleeding
- Shoving
- Corrugation
- Pothole
- Ravelling
- Delamination
SeeROAD APPLICATION

### Pothole Management

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- ‘identified’ potholes tagged in red
SeeROAD APPLICATION

SeeROAD

Pothole Management

Change Detection

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‘repaired’ potholes tagged in green
SeeROAD APPLICATION

Before Monsoons: April 2011

During Monsoons: August 2011
SeeROAD BENEFITS

• Identify and tag various types of potholes
• Maintain the ‘record of reality’ of the road condition
• Change detection and analysis using periodic panoramic imagery
• Keep track of materials and progress of civil work activity
• Keep track of maintenance cycles
• Integrated Contractor MIS
• Generate reports to evaluate contractor performance
Moving toward a model-centric design approach

- Ability to impact cost and performance
- Cost of design changes
- Drafting-centric design
- Model-centric design

Graphic originated by Patrick MacLeamy, AIA/HOK
### BIM Dashboard

#### PRESIDIO PARKWAY

**COST**

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**RIGHT OF WAY**

| ENVIRONMENTAL | $0 |

**ACCELERATED ESTIMATE**

| $0 |

**ACCELERATION SAVINGS**

| $0 |

**BASELINE ESTIMATE**

| $0 |

**SCHEDULE**

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<td>UTILITY RELOCATION</td>
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**WEEKLY PROJECT PROGRESS**

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Advanced Visualization: 3-D Image or Video

- Photo simulation of proposed overpass condition on Highway (top)

- 3D animation of the flyover (middle)

- Existing and proposed conditions in a 3-D split-screen, fly-over visualization (bottom)
4D Video Visualization

- Screenshot from a 4-D video for Highway project. The video includes parcel data, highway and building images, roadway infrastructure, and moving vehicular traffic.
- Yellow lines represent parcel boundaries; green lines represent existing ROW boundaries; red and blue lines represent future ROW boundaries after acquisition.
BIM’s Return On Investment

- Up to 40% elimination of unbudgeted change
- Up to 80% reduction in time taken to generate a cost estimate
- Cost estimation accuracy within 3%
- A savings of up to 10% of the contract value through clash detections
- Up to 7% reduction in project time

Stanford University Center for Integrated Facilities Engineering (CIFE) figures based on 32 major projects using BIM
THANK YOU