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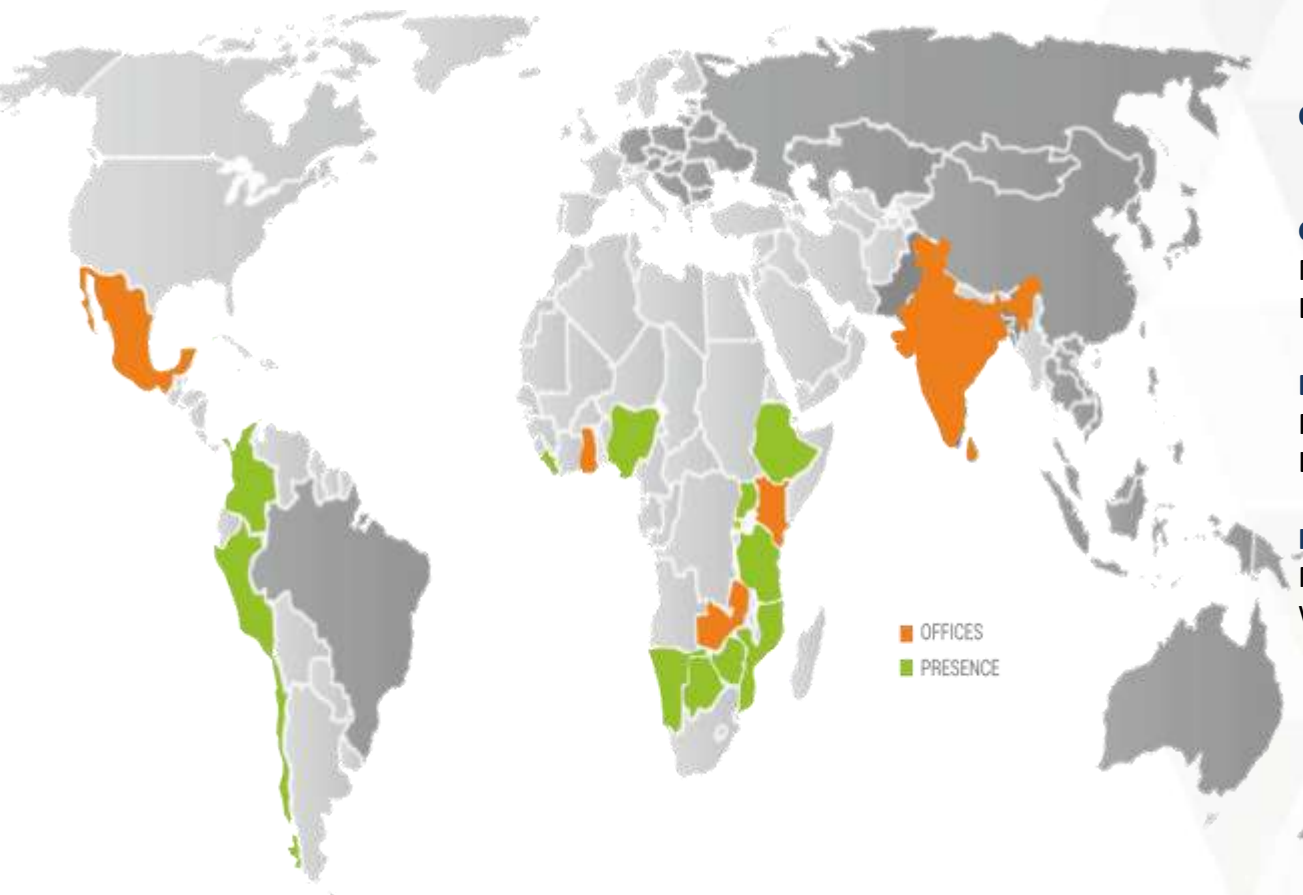# Integrated Road Asset Management System-IRAMS

Abhay Kimmatkar
Jt. Managing Director

ADCC Infocad Limited
ISO Certified | CRISIL Rated | BSE-SME Listed

BSE SME
EXPERIENCE THE NEW

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)

OFFICES
PRESENCE

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.

ADCC Infocad Limited
ISO Certified | CRISIL Rated | BSE-SME Listed

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

1,500 +
Satisfied Clientele

1,900 +
Employees

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
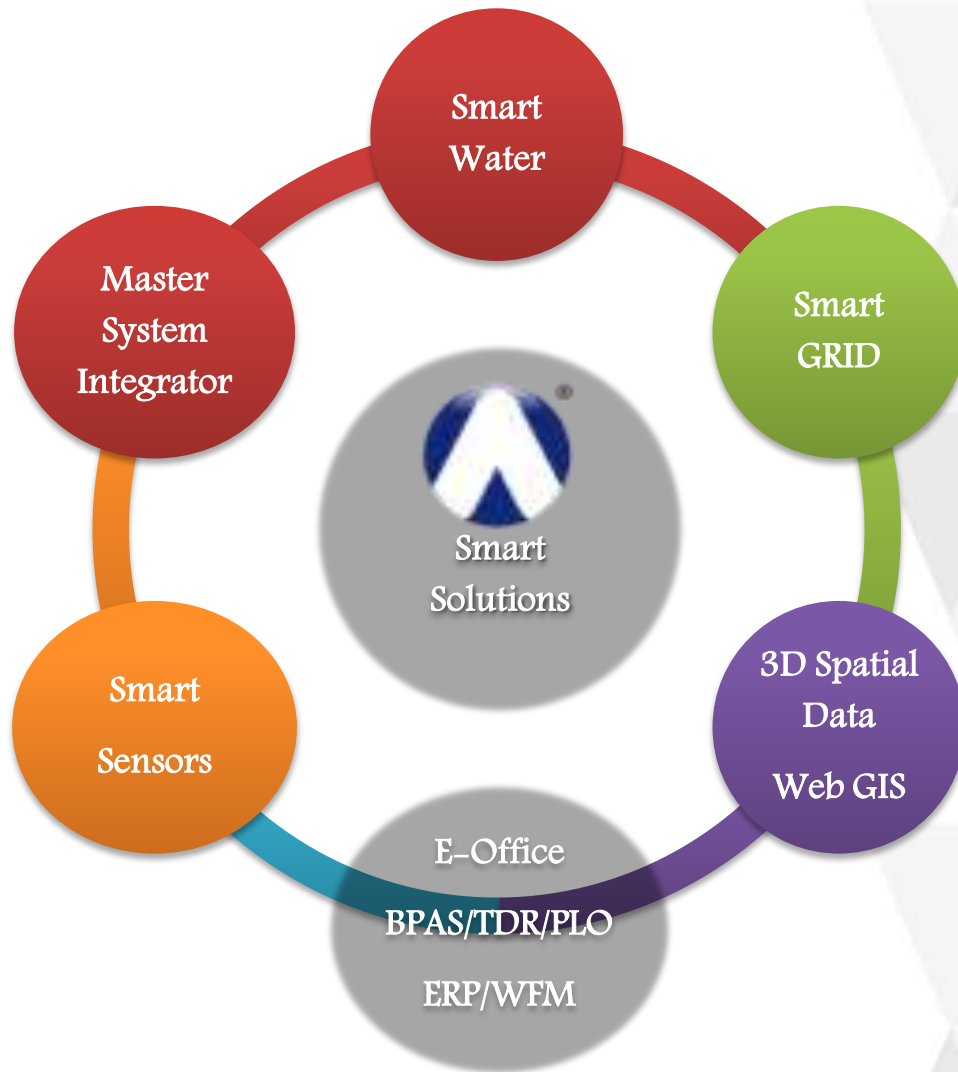 (Digital Marketing/ SEO)

INDUSTRIAL SOFTWARE SOLUTION
INTERGRAPH Autodesk esri Adobe
ANSYS SIEMENS Bentley

EDUCATION SOFTWARE SOLUTION
TheMathWorks INTERGRAPH DASSAULT SYSTEMES
SIEMENS esri Bentley Adobe

ADCC ACADEMY PVT. LTD.
Autodesk TheMathWorks VARSITY
COREL DALE CARNEGIE TRAINING INDIA Adobe DASSAULT SYSTEMES

ADCC Infocad Limited
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ADCC's SOLUTIONS

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

Smart GRID: SCADA Solutions, R-APDRP, MDS , Infra, GIS Solutions.
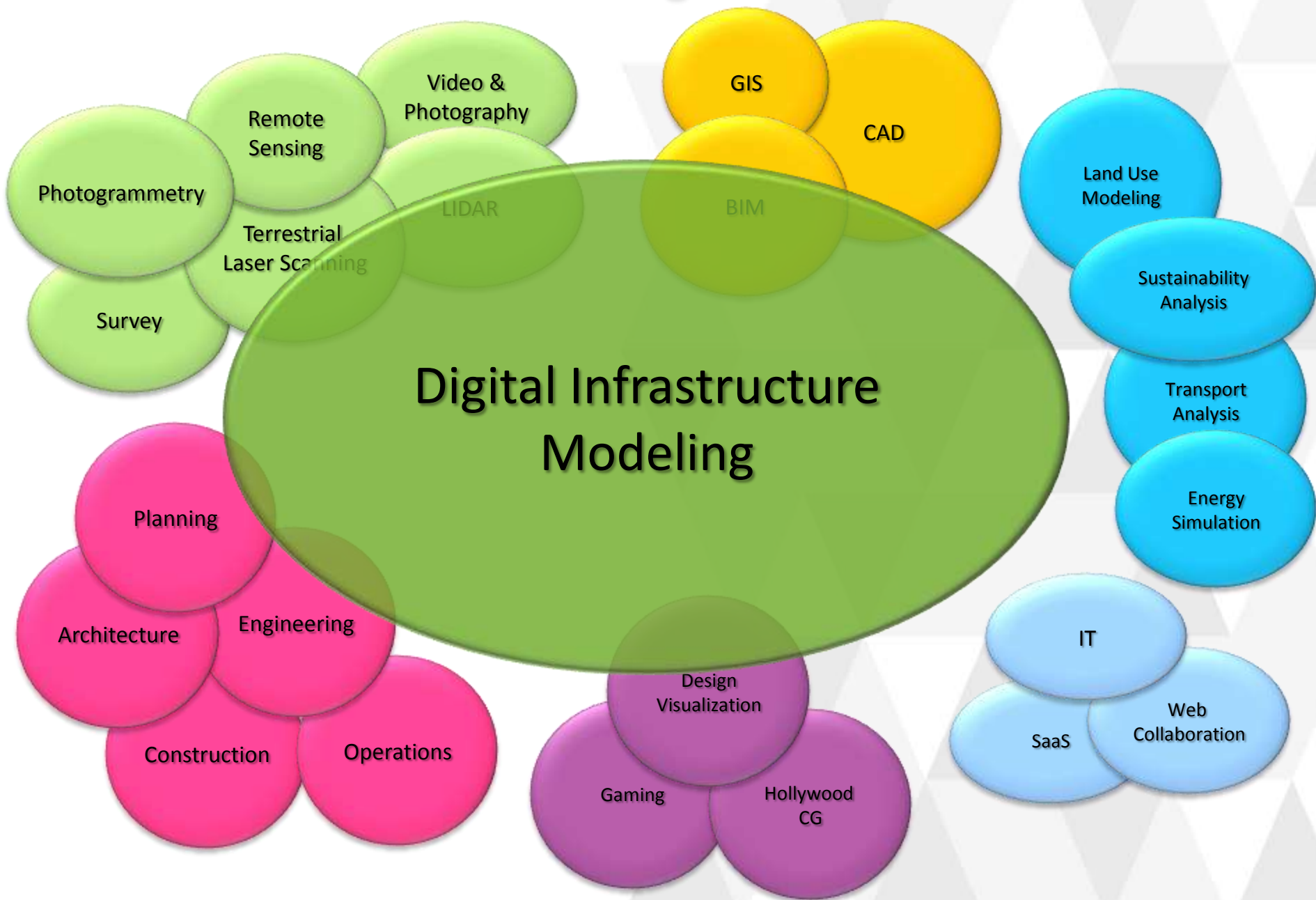
3D Spatial Data (Web GIS) : DGPS,ETS, Photogrammetry, **Lidar**, 3D Building , Modeling, Web **GIS.LBS,RAMS**

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

Convergence

Digital Infrastructure Modeling

Photogrammetry · Survey · Remote Sensing · Terrestrial Laser Scanning · Video & Photography · LIDAR

GIS · CAD · BIM

Land Use Modeling · Sustainability Analysis · Transport Analysis · Energy Simulation

Planning · Architecture · Engineering · Construction · Operations

Design Visualization · Gaming · Hollywood CG

IT · SaaS · Web Collaboration

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

Data

Performance modelling

Alternative development

Programme optimisation

Project selection

Implemen-tation

Monitoring / feedback

Goals

Policies

Budgets
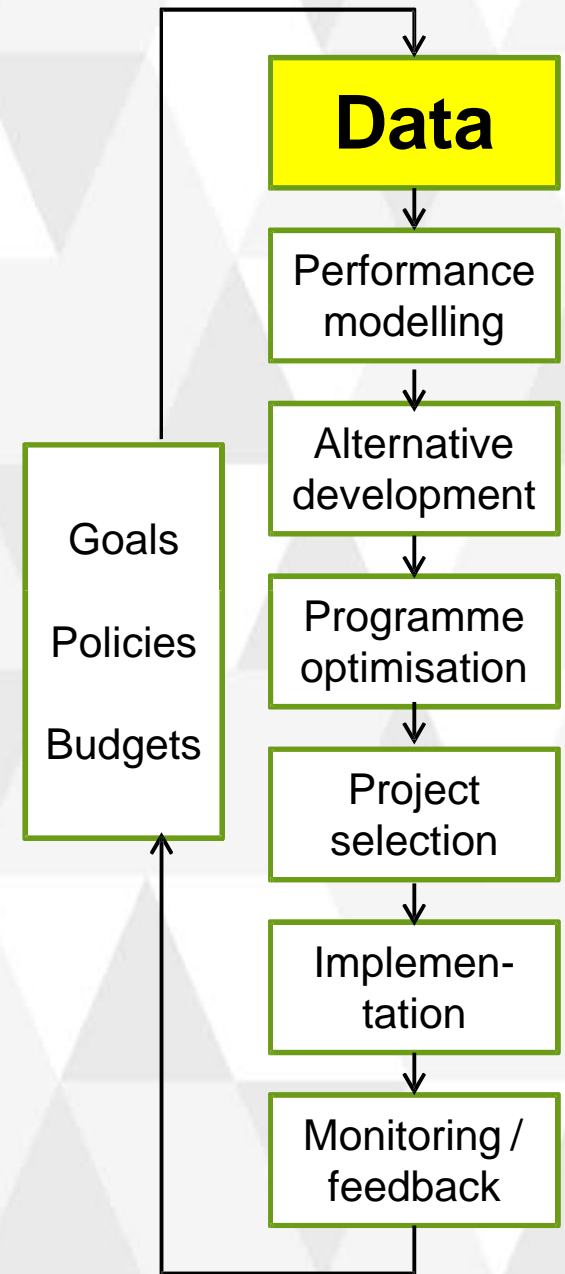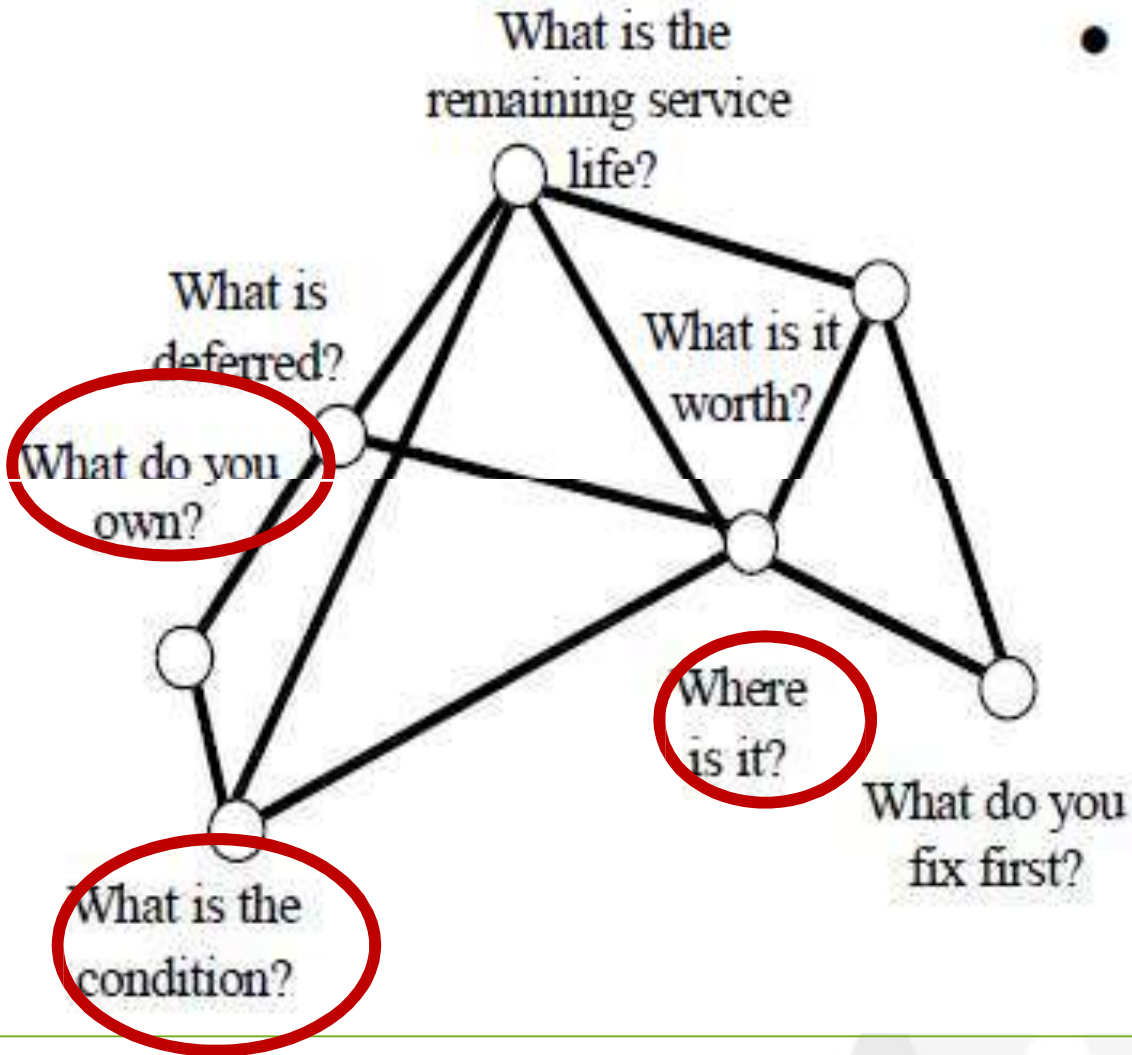
Unified view of inventory is essential …

- 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

Systematic inventory updates

➢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

Spatial Video

LiDAR

Time

- measuring wheel & paper/PDA
- GPS enabled tablets

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

- 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 accuracy positioning (10 – 30 mm) an[d] 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
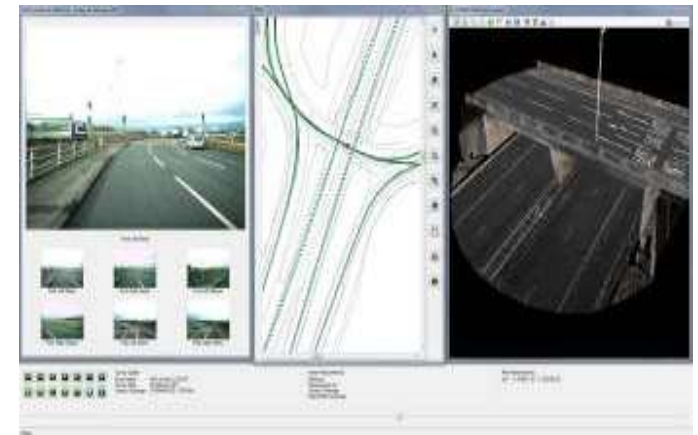
Integration with Asset Management Systems
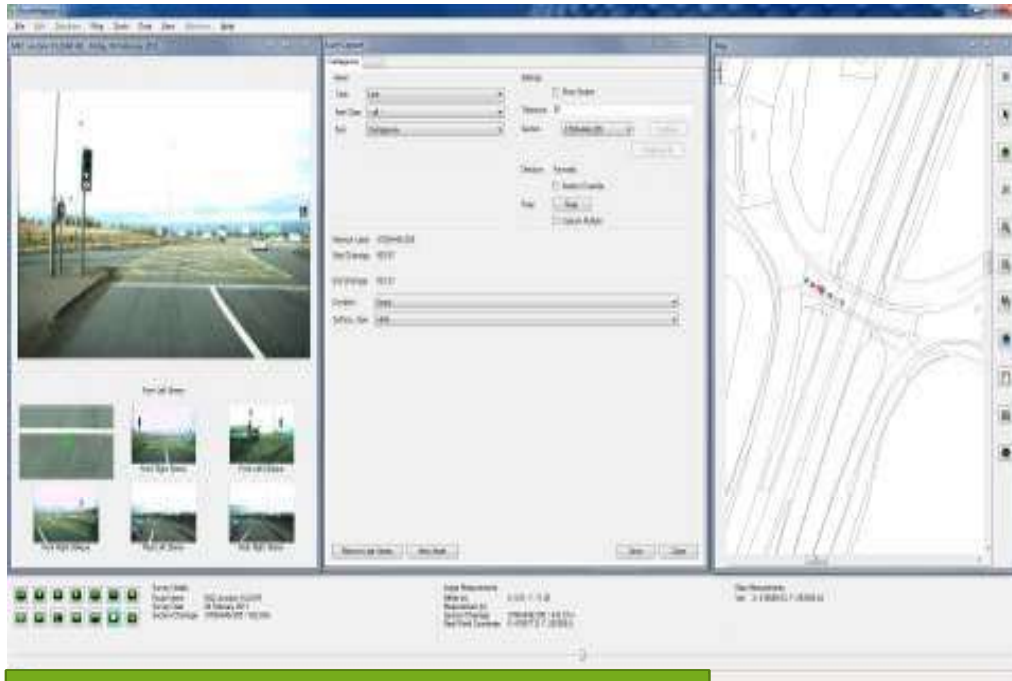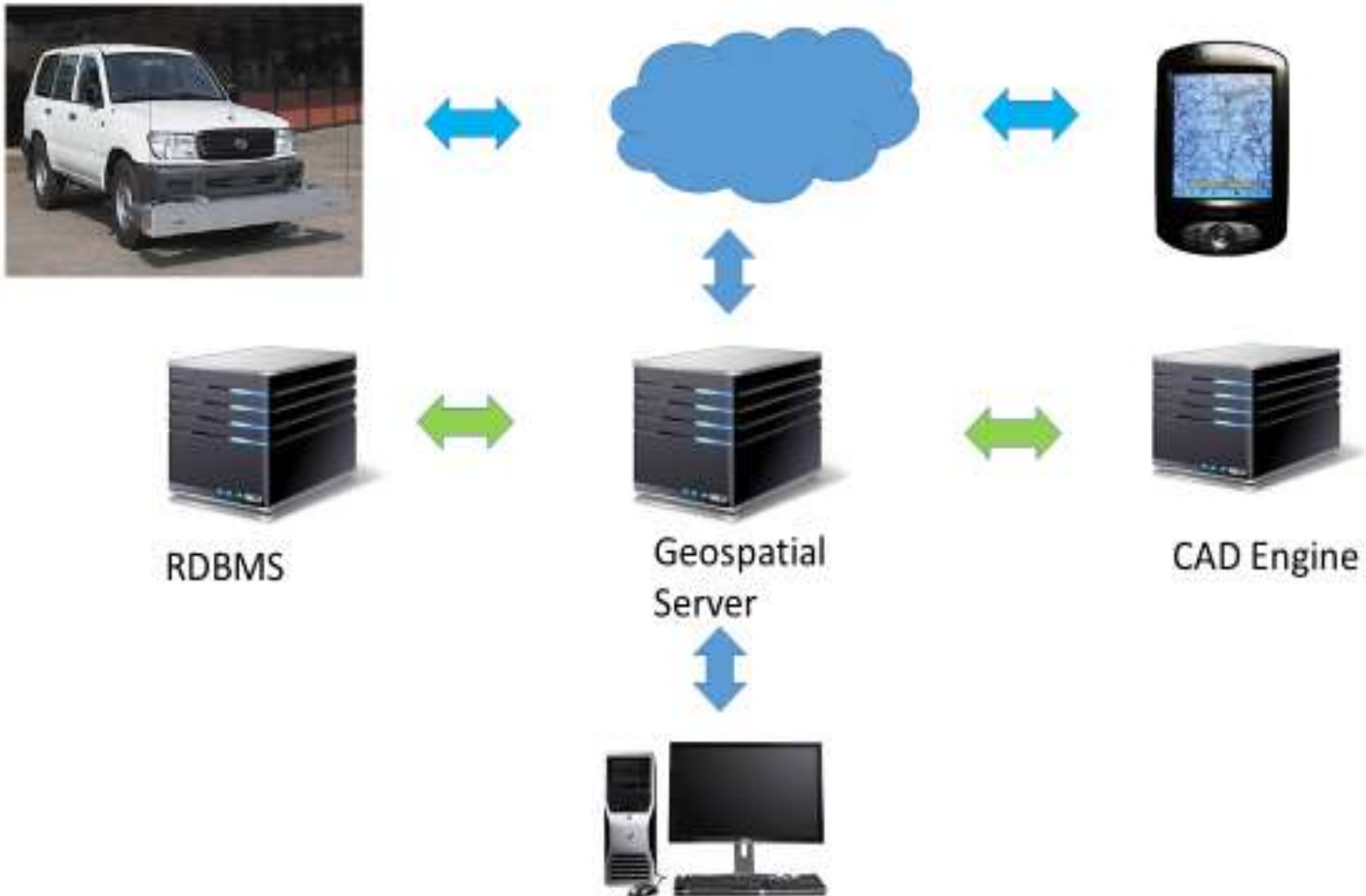

Digitising asset inventory
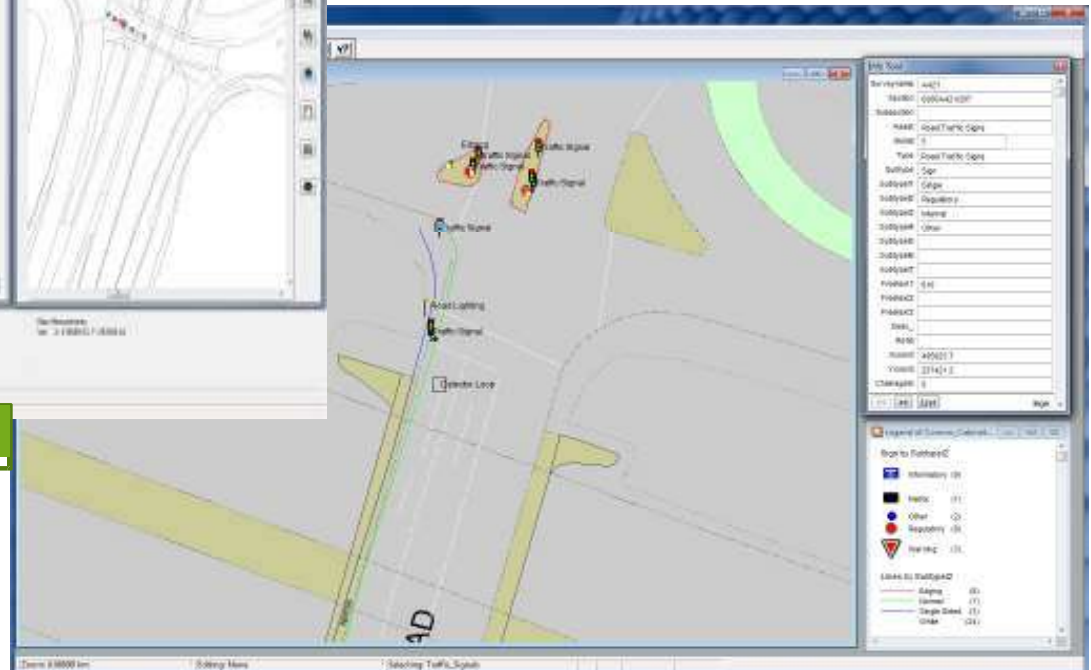
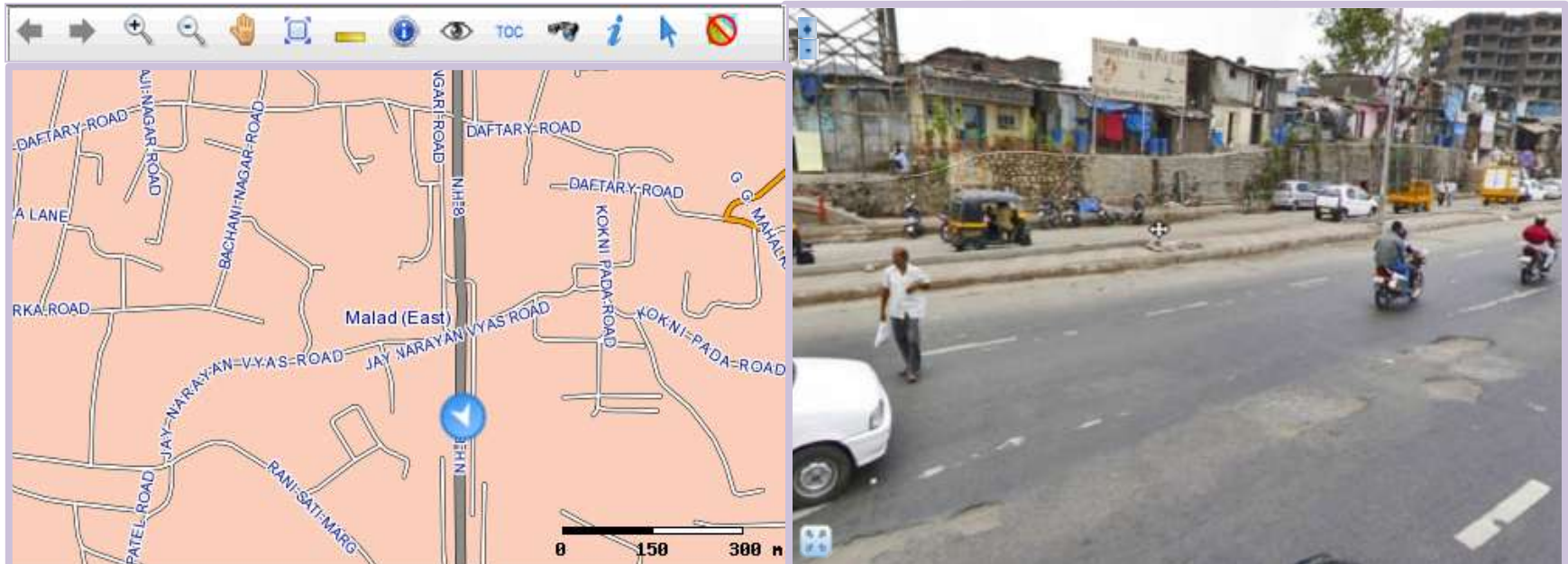... and export it to Asset Management and GIS systems

Data Collection → **Database** → **Decision Support** → **Management Information**

Components of Road Asset Management System

Architecture of Road Asset Management system

RDBMS

Geospatial
Server

CAD Engine

SeeROAD

Unique ID	Type of Pothole	Area	Type of Repair	Contractor Details	Tender Status	Allocation Date	Completion Date	Repair Status
MCGM_PS_01	Pothole	Malad (W)	Filling	Rambabu	Awarded	4-Aug-11	14-Aug-11	In Progress
MCGM_PS_02	Shovel	Malad (W)	Patching	Rambabu	Awarded	4-Aug-11	14-Aug-11	Complete
MCGM_PS_03	Delamination	Malad (W)	Patching	Rambabu	Awarded	4-Aug-11	14-Aug-11	Complete
MCGM_PS_04	Pothole	Malad (W)	Filling	Rambabu	Awarded	4-Aug-11	14-Aug-11	In Progress
MCGM_PS_05	Ravelling	Malad (W)	Patching	Rambabu	Awarded	4-Aug-11	14-Aug-11	In Progress

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

SeeROAD APPLICATION

Unique ID	Type of Pothole	Area	Type of Repair	Contractor Details	Tender Status	Allocation Date	Completion Date	Repair Status
MCGM_PS_01	Pothole	Malad (W)	Filling	Rambabu	Awarded	4-Aug-11	14-Aug-11	In Progress
MCGM_PS_02	Shovel	Malad (W)	Patching	Rambabu	Awarded	4-Aug-11	14-Aug-11	Complete
MCGM_PS_03	Delamination	Malad (W)	Patching	Rambabu	Awarded	4-Aug-11	14-Aug-11	Complete
MCGM_PS_04	Pothole	Malad (W)	Filling	Rambabu	Awarded	4-Aug-11	14-Aug-11	In Progress
MCGM_PS_05	Ravelling	Malad (W)	Patching	Rambabu	Awarded	4-Aug-11	14-Aug-11	In Progress

● 'identified' potholes tagged in red

SeeROAD APPLICATION

Unique ID	Type of Pothole	Area	Type of Repair	Contractor Details	Tender Status	Allocation Date	Completion Date	Repair Status
MCGM_PS_01	Pothole	Malad (W)	Filling	Rambabu	Awarded	4-Aug-11	14-Aug-11	In Progress
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MCGM_PS_05	Ravelling	Malad (W)	Patching	Rambabu	Awarded	4-Aug-11	14-Aug-11	In Progress

● 'repaired' potholes tagged in green

SeeROAD APPLICATION

Before Monsoons: April 2011

During Monsoons: August 2011
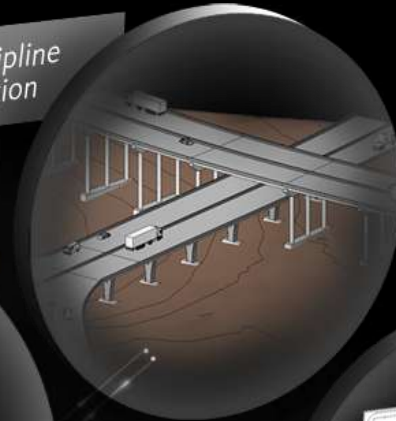
SeeROAD BENEFITS

- 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
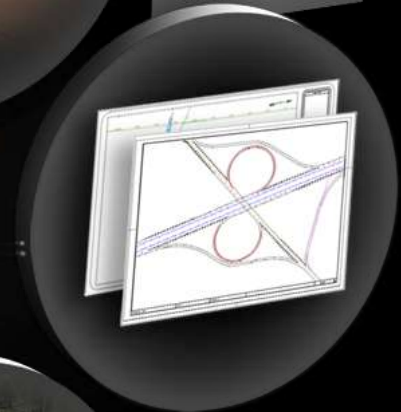- Generate reports to evaluate contractor performance

Owners

Architects

BIM

Builders & Fabricators

Civil Engineers

MEP Systems Engineers

Structural Engineers

Surveying & Data Collection

Multidiscipline Coordination

Simulation & Analysis

Modeling & Design

Construction Documentation

Visualization

Construction, Operations & Asset Management
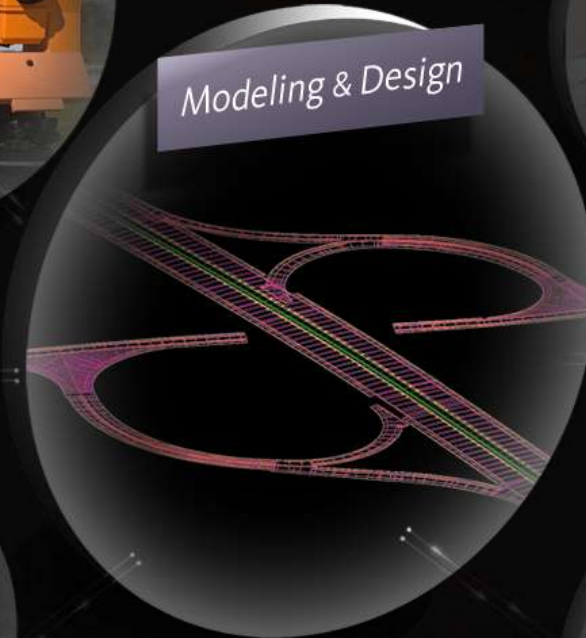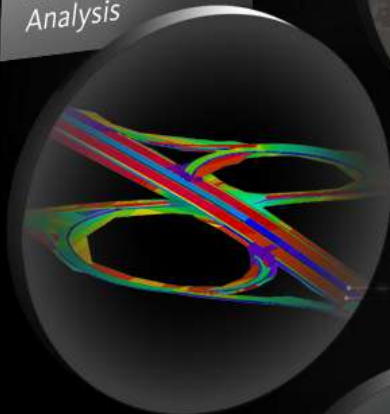
Moving toward a model-centric design approach

Ability to impact cost and performance

Cost of design changes

Drafting-centric design

Model-centric design

Conceptual Design   Detailed Design   Construction Documentation   Construction   Operation

Effect / Cost / Effort
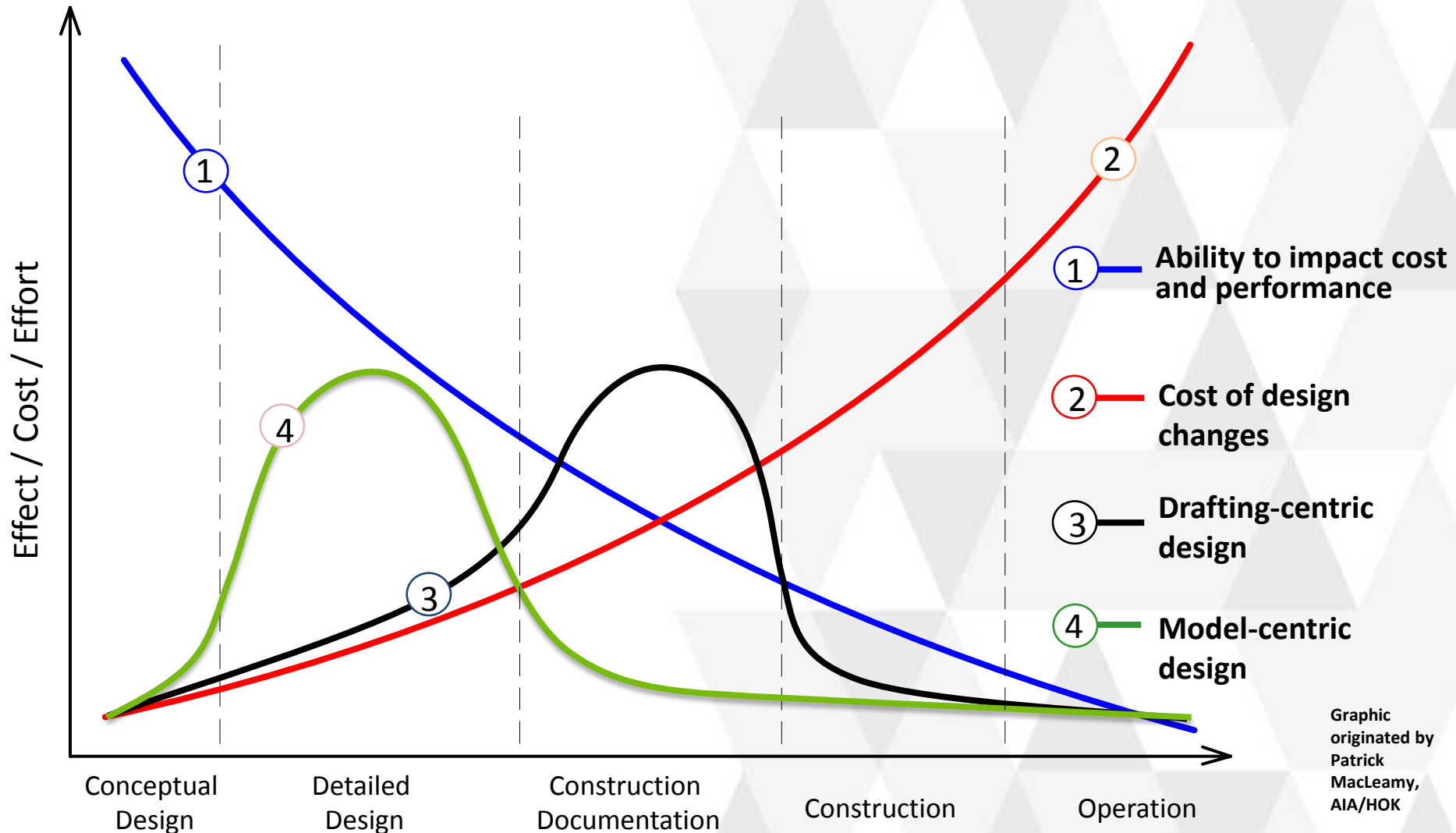
Graphic originated by Patrick MacLeamy, AIA/HOK

BIM Dashboard
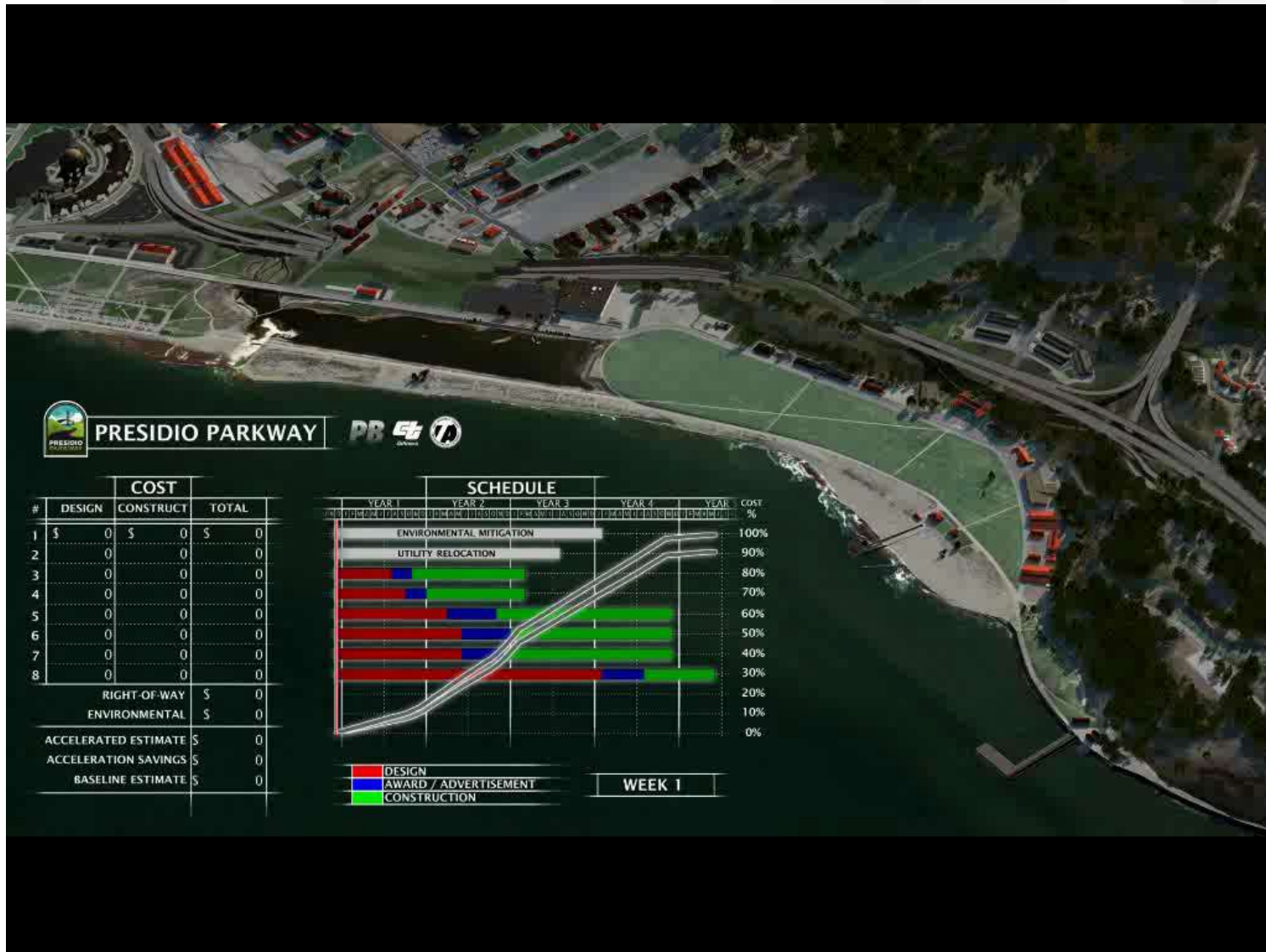
Advanced Visualization: 3-D Image or Video

- 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