NATIONAL RURAL INFRASTRUCTURE DEVELOPMENT AGENCY (NRIDA)
MINISTRY OF RURAL DEVELOPMENT
GOVERNMENT OF INDIA

सत्यमेव जयते

Pradhan Mantri
Gram Sadak Yojana

eMARG

(electronic Maintenance of Rural Roads under PMGSY)

www.emarg.gov.in

THE ROAD TO DIGITAL TRANSFORMATION

EXCELLENCE IN GOVERNMENT PROCESS REENGINEERING FOR DIGITAL TRANSFORMATION

Development Partners

NIC एन आई सी
National
Informatics
Centre

Rural Road Connectivity

Pradhan Mantri Gram Sadak Yojana

7,78,625 km of roads sanctioned

6,81,984 km roads constructed

3,40,370 Cr Asset value worth
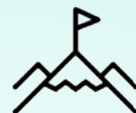
12% of India's entire road network

1,78,000+ habitations connected

40.5 Cr population (**48%** rural population) benefitted

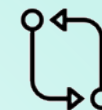## PMGSY Roads: Lifeline of Rural India

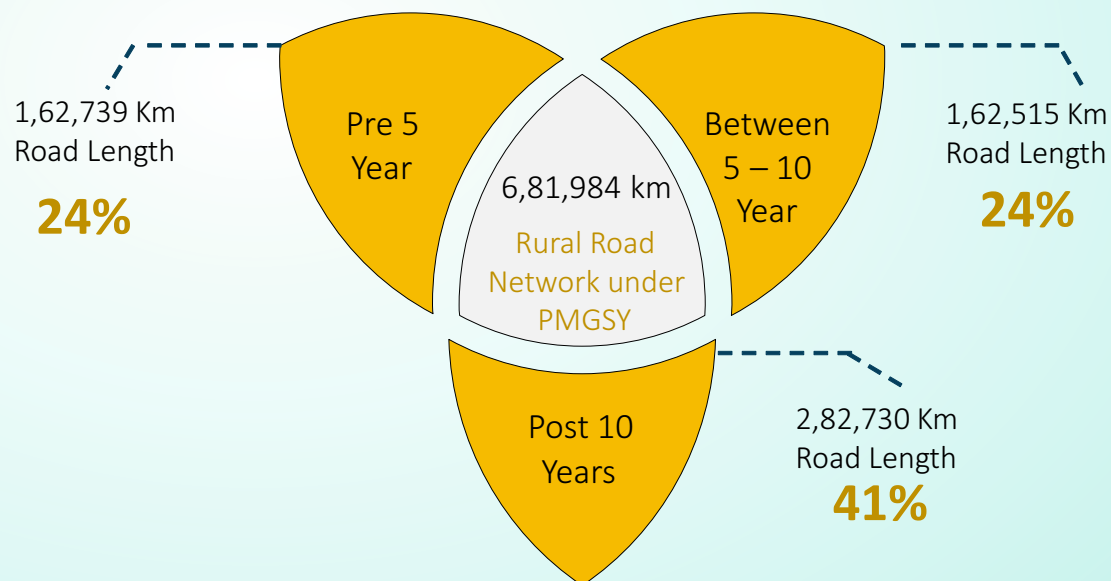Promotes access to economic and Social Services

Increased Agricultural Income

Productive Employment Opportunities for Rural population
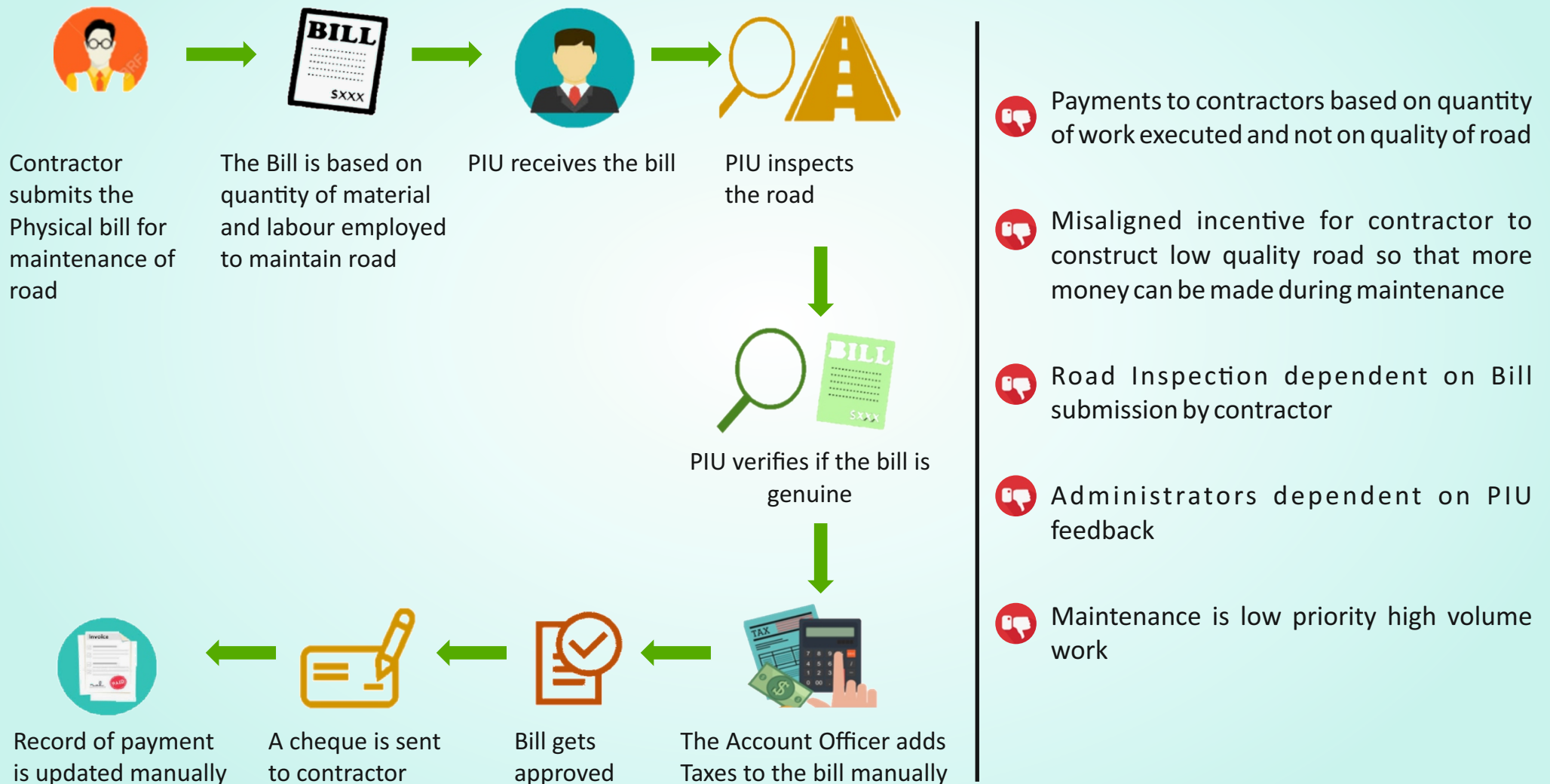
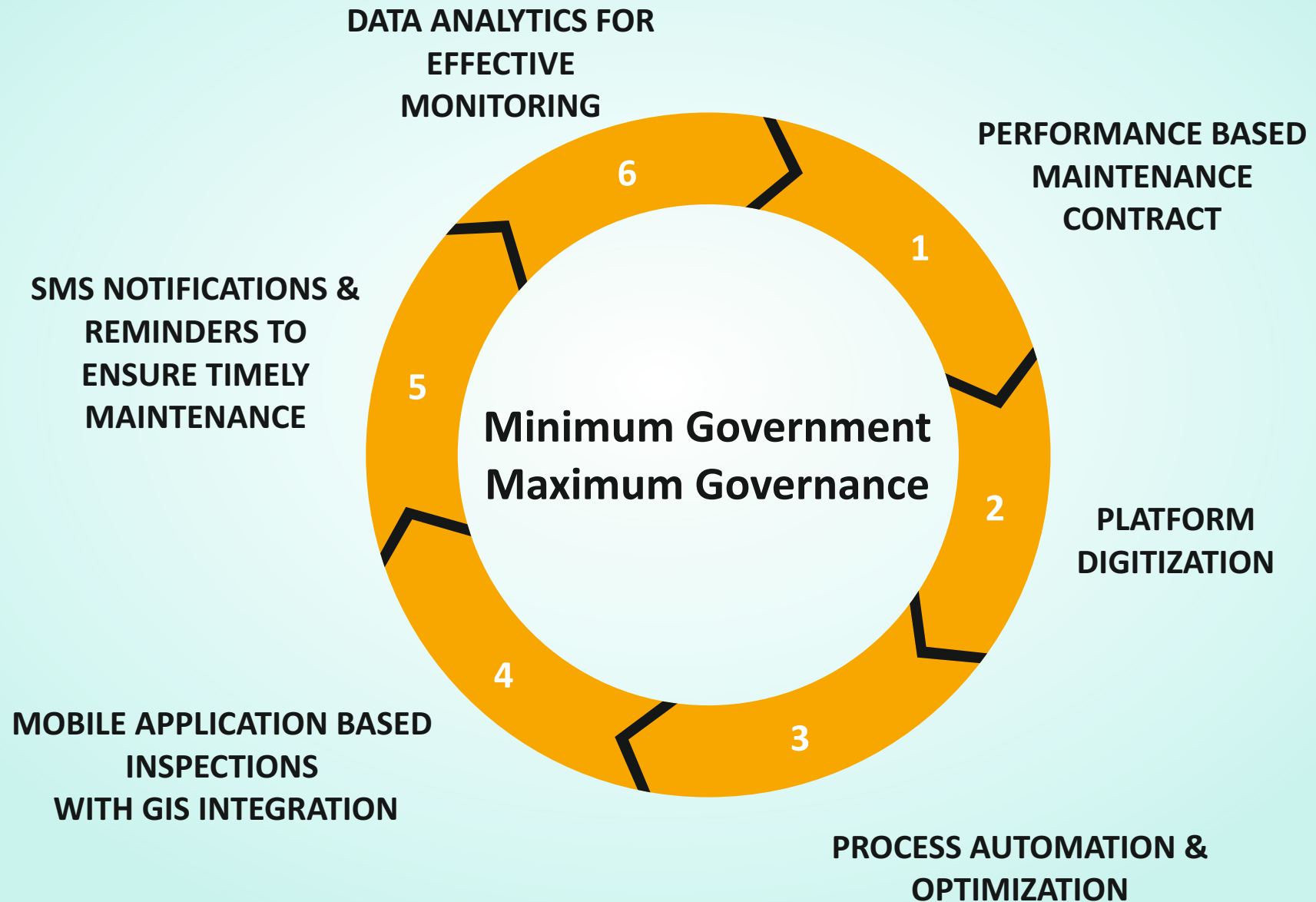Sustainable Poverty Reduction

Asset Created in PMGSY Scheme

Pre 5 Year

Between 5 – 10 Year

Post 10 Years

6,81,984 km
Rural Road Network under PMGSY

1,62,739 Km Road Length
24%

1,62,515 Km Road Length
24%

2,82,730 Km Road Length
41%

Salient Feature of PMGSY- Five year Guarantee period with construction Routine maintenance of roads is key to preserving assets for design life

MAINTENANCE BEFORE eMARG
BILL OF QUANTITIES (BOQ)

Contractor submits the Physical bill for maintenance of road

The Bill is based on quantity of material and labour employed to maintain road

PIU receives the bill

PIU inspects the road

PIU verifies if the bill is genuine

The Account Officer adds Taxes to the bill manually

Bill gets approved

A cheque is sent to contractor

Record of payment is updated manually

- Payments to contractors based on quantity of work executed and not on quality of road

- Misaligned incentive for contractor to construct low quality road so that more money can be made during maintenance

- Road Inspection dependent on Bill submission by contractor

- Administrators dependent on PIU feedback

- Maintenance is low priority high volume work

GOVERNMENT PROCESS RE-ENGINEERING
RURAL ROAD MAINTENANCE

DATA ANALYTICS FOR
EFFECTIVE
MONITORING

6

PERFORMANCE BASED
MAINTENANCE
CONTRACT

1

SMS NOTIFICATIONS &
REMINDERS TO
ENSURE TIMELY
MAINTENANCE

5

**Minimum Government
Maximum Governance**

2

PLATFORM
DIGITIZATION

4

3

MOBILE APPLICATION BASED
INSPECTIONS
WITH GIS INTEGRATION

PROCESS AUTOMATION &
OPTIMIZATION

eMARG
Electronic Maintenance of Rural Roads

⟳ IT re-engineering for all functions related to the execution, monitoring and management of rural road maintenance centered around outcomes and evidence

⟳ End to end digitization of all processes related to maintenance from billing, verification of work, final payment to contractors and monitoring.

⟳ Fusion of multiple e-governance technologies such as Web ERP, GIS, mobile apps, SMS, digital payments and accounting.

⟳ Creation of Login credentials for all the stake holders

| Contractor | Field Engineer | District In-Charge | Account Officers | State HQ | NRIDA | MORD |
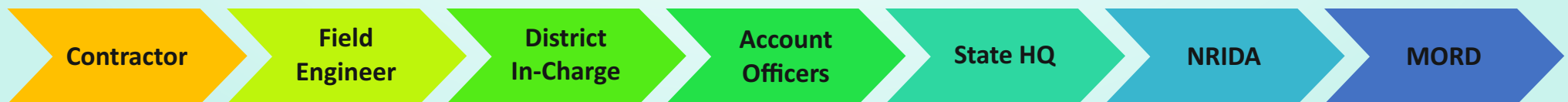
Stakeholders

SWITCHING TO PERFORMANCE BASED MAINTENANCE CONTRACTS (PBMC)

FOCUS ON OUTCOMES AND NOT INPUTS – BECAUSE THAT IS WHAT MATTERS FOR THE CITIZENS

BOQ system (OLD)

- INPUT BASED
- MEASURE THE SIZE OF THE POTHOLES FILLED AND MATERIAL INVOLVED
- PAY CONTRACTOR BASED ON THE SAME
- NO GUARANTEE ROAD IS IN GOOD CONDITION

High Administrative Burden

PBMC (NEW)

- OUTCOME BASED
- MEASURE IF THE ROAD FINALLY IS IN GOOD CONDITION OR NOT
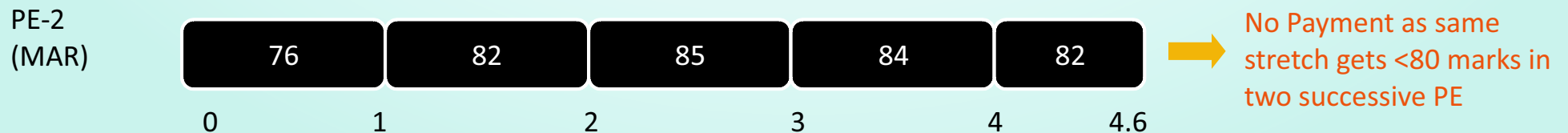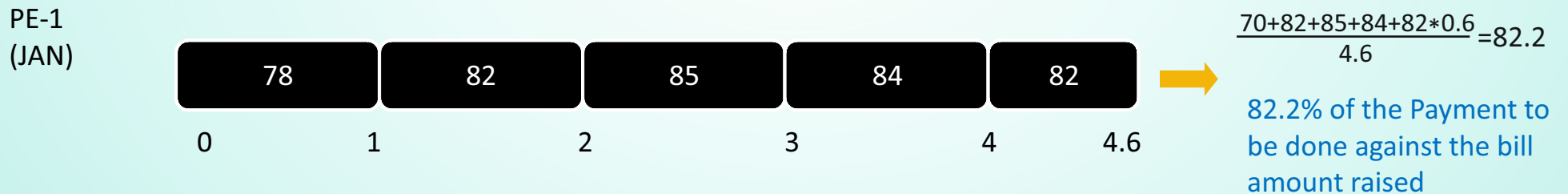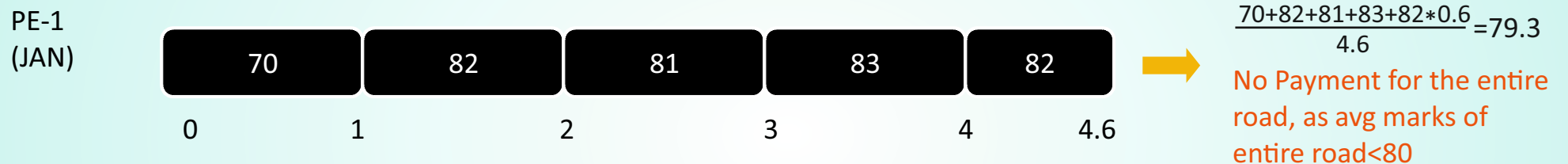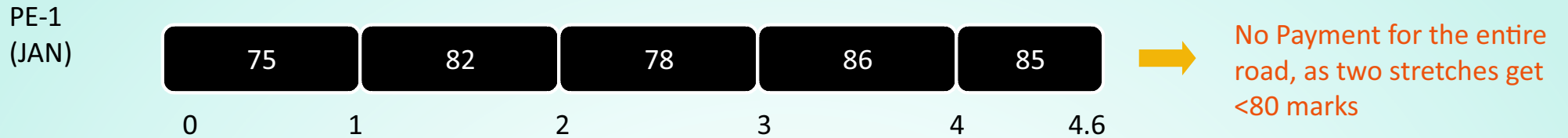- UNRELATED TO HOW MUCH EFFORT CONTRACTOR PUT IN BRING ROAD TO GOOD CONDITION

High Administrative Burden

PERFORMANCE RUBRIC FOR MAINTENANCE OF ROAD
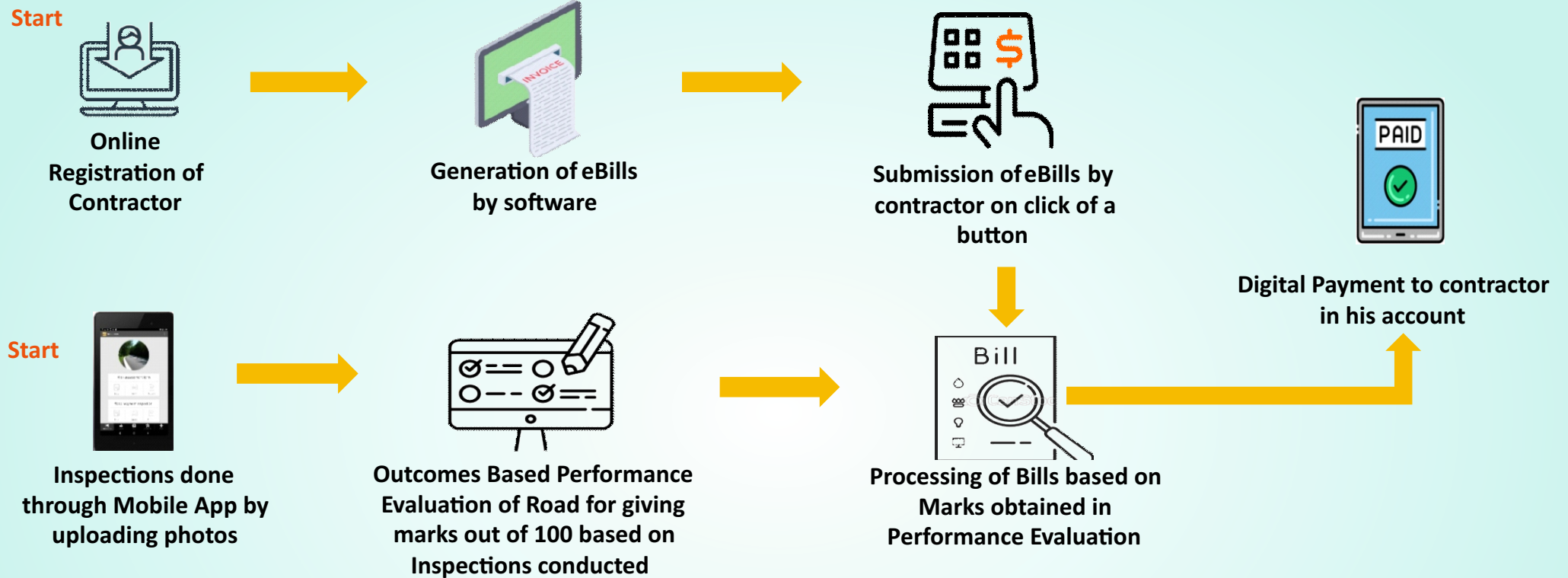
S.No	Parameters	Marks
1	Maintenance of surface of road including filling potholes and patch repairs etc.	50
2	Making up of berms/shoulders	20
3	Restoration of rain cuts and dressing of side slopes/berms	10
4	Maintenance of drains	3
5	Maintenance of culverts and cause ways	4
6	Miscellaneous	13
	TOTAL	**100**

Score (?/100)	Payment
< 80	NIL
Between 80-100 (say 85)	85% of maintenance amount

CRITERIA FOR PAYMENT

PE-1 (JAN)

75	82	78	86	85

0   1   2   3   4   4.6

No Payment for the entire road, as two stretches get <80 marks

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PE-1 (JAN)

70	82	81	83	82

0   1   2   3   4   4.6

$$\frac{70+82+81+83+82*0.6}{4.6}=79.3$$

No Payment for the entire road, as avg marks of entire road<80

PE-1 (JAN)

78	82	85	84	82

0   1   2   3   4   4.6

$$\frac{70+82+85+84+82*0.6}{4.6}=82.2$$

82.2% of the Payment to be done against the bill amount raised

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PE-2 (MAR)

76	82	85	84	82

0   1   2   3   4   4.6

No Payment as same stretch gets <80 marks in two successive PE

MAINTENANCE AFTER eMARG

Start

Online Registration of Contractor

→

Generation of eBills by software

→

Submission of eBills by contractor on click of a button

↓

PAID

Digital Payment to contractor in his account

↑

Start

Inspections done through Mobile App by uploading photos

→

Outcomes Based Performance Evaluation of Road for giving marks out of 100 based on Inspections conducted

→

Processing of Bills based on Marks obtained in Performance Evaluation

→

👍 Measuring outcomes is easier than measuring inputs

👍 Contractor incentivized to construct better road such that less inputs in maintaining road but still gets good outcomes

👍 Delinking of Billing and inspection

👍 Evidence based assessment of roads

👍 Digitization of entire process

👍 eBill Generation and Submission

👍 Digital Payments with DSC

👍 System generated vouchers based on score leading to less to-fro between account officers and District Engineers on amount

Government Process Re-engineering (Pre-Post)

Process	Before	After
Bill Submission	• Bills submitted manually based on labour/ material involved in maintenance • No control / record of date or frequency of Bill submission	• eBill submitted in one click online with fixed maximum monthly amount • Monthly alerts for bill submission • No dispute around date of submission of bill
Routine Inspections	• Inspection triggered by bill submission. A bad road without bill submitted will not be inspected • No permanent record or evidence of routine inspection	• Bi-monthly Inspections done through eMARG mobile app with geo-tagged photos • Mobile notifications for reminders
Verification of Work & Bill	• Primarily on the basis of volume /labour/material of work executedie based on inputs • Done Manually by Engineers against the bill raised by contractor	• Bill amount calculated by system based on marks awarded in Performance Evaluation ie outcomes • Photographs clicked in RI are used as base for this evaluation

Government Process Re-engineering (Pre-Post)

Process	Before	After
Voucher Generation	• Done Manually by Account Officer after deducting taxes manually from the approved Bill Amount	• System generated with automatic tax deductions etc under Account Officer Login & DSC for digital signing of vouchers
Payments	• Done manually by Checque Payment and then entered into online accounting software	• Directly into contractors account; single account per contractor. • Transaction sent to accounting software automatically by API
Cost Saving	• Payments made for periods where road was not maintained because of lack of routine evidence	• Payment only based on months where minimum serviceability or performance is ensured
Data Analytics	• Only limited to total expenditure against roads	• Process level monitoring: Reports, reviews, photographs and GIS

USE OF APP AND MOBILE TECHNOLOGY

eMARG MOBILE APP FOR CONDUCTING ROUTINE INSPECTIONS
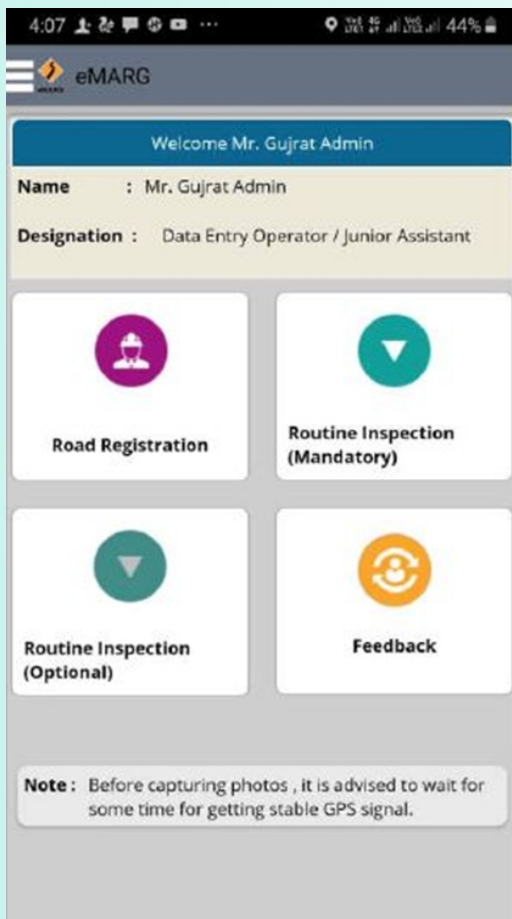
- Location for conducting inspections for every km auto generated by app

- Two geo-tagged photographs per kilometer clicked

- Each stretch is graded as Satisfactory/Unsatisfactory

- App operates in offline mode and provision to upload photographs later when one comes in network area

- District/State/Centre can conduct additional inspections on random road visits

SMS NOTIFICATIONS

- SMS Notifications to contractors for submitting the bills every month

- SMS Notifications to district engineers to conduct Routine Inspections every two months

- SMS Notification to contractors in case the road gets Unsatisfactory grading in inspection

- Every payment related transaction authenticated with OTP

ROUTINE INSPECTIONS – ROAD PICTURES AVAILABLE ON GOOGLE MAP FOR MONITORING

MONITORING AND DATA ANALYTICS

- Package Verification, Contractor Registration, no. of DSC enrolled
- Status of Pending, cleared and paid bills
- Inspection Analysis of RIs and PEs conducted
- Bills with zero payments (less than 80 marks)
- Packages Pending for Payment for more than 6 months
- Liability projections for next Financial Years
- Dashboards and User Level Action OrientedTasksheets

More than 30 reports available in system for efficient monitoring by States and Ministry

PowerBI integration

Pilot in 2 Districts to use AI to classify road condition based on pictures to flag anomalous performance evaluations. Eg. 100 marks for this picture.


{Prediction: Poor
Confidence: 92%}

CAPACITY BUILDING [POLICY AND TECHNOLOGY]

- Massive policy change from BOQ to PBMC requiring support from the highest levels in each state

- Many field civil engineers not very IT savvy.

- Multiple trainings conducted directly with field engineers.

- Training conducted through Video Conferencing during the times of COVID pandemic

- Refresher trainings also conducted for states from time to time

- Online ticketing system for e-submission of queries with relevant documents

- Dedicated on-call support through the week for PIU

300 hours of training imparted in last 1 year

3500+ tickets cleared through eTicketing system

Dedicated on-call support resources for help
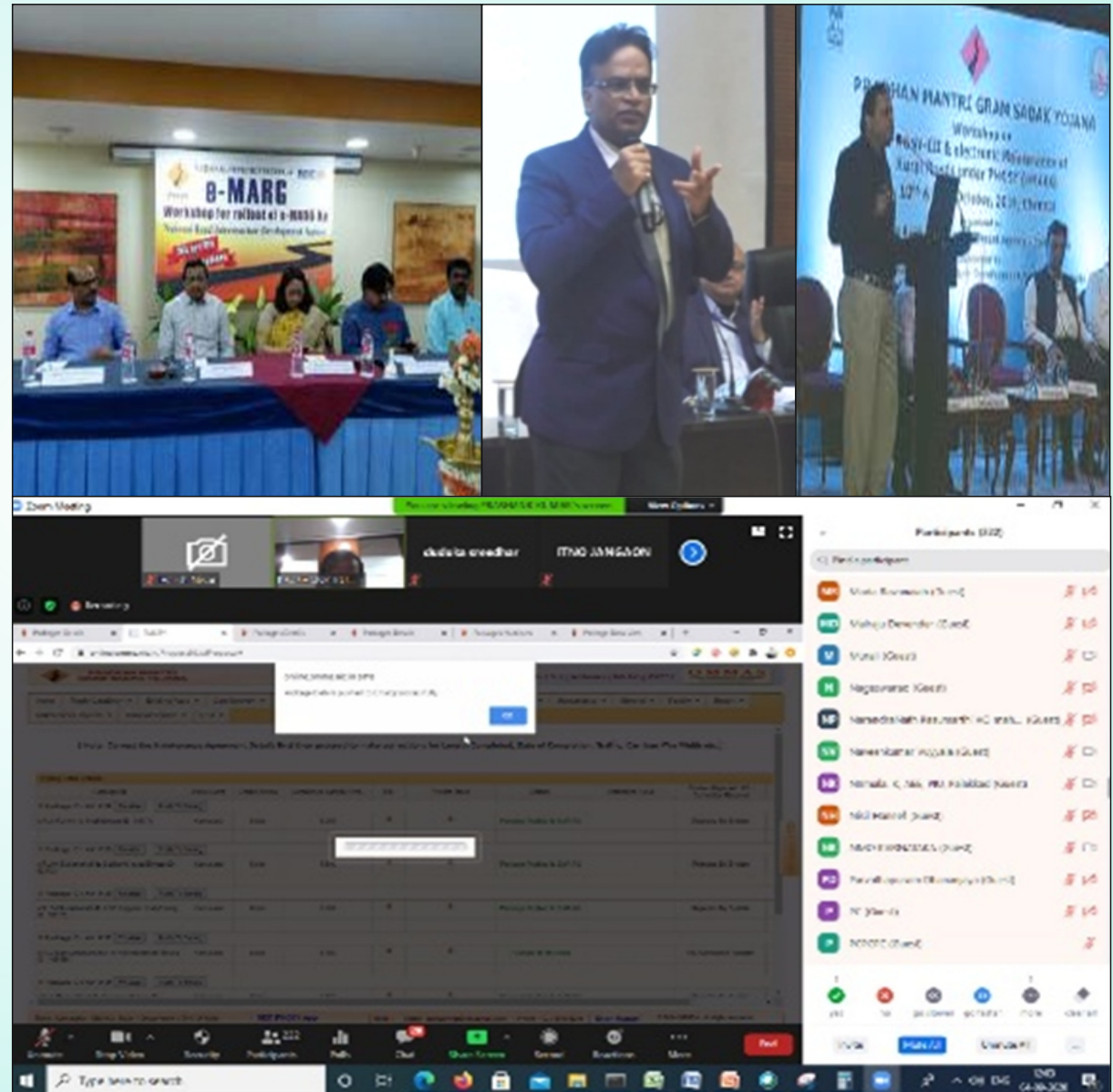
PROGRESS MADE SO FAR

★ Milestone of 1000 Cr Payment through eMARG Achieved

29
States and UTs making payments

1,330
Engineers from 737 districts PAN India using eMARG

13,038
Contractors registered on eMARG

1,96,000 km
Road available in eMARG for payments

5,07,242
Routine Inspections carried out

10,00,000+
Photographs on record for seeing the condition of roads

8,91,539
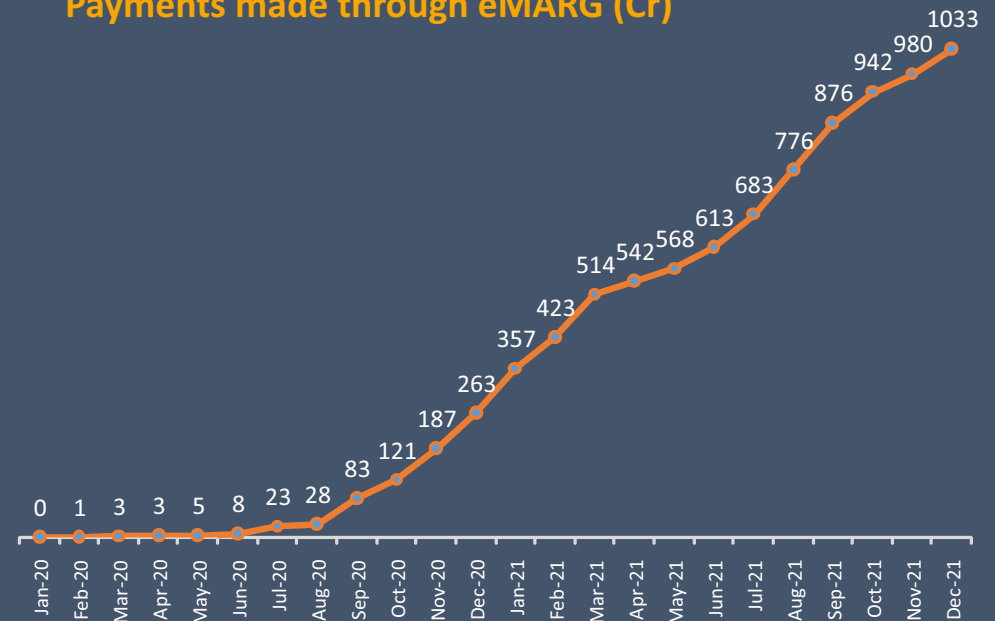Bills Submitted by contractors across country

1,033 Cr
Payments disbursed Nationally

5,662
Zero Payment Roads

Payments made through eMARG (Cr)

Data points: Jan-20: 0, Feb-20: 1, Mar-20: 3, Apr-20: 3, May-20: 5, Jun-20: 8, Jul-20: 23, Aug-20: 28, Sep-20: 83, Oct-20: 121, Nov-20: 187, Dec-20: 263, Jan-21: 357, Feb-21: 423, Mar-21: 514, Apr-21: 542, May-21: 568, Jun-21: 613, Jul-21: 683, Aug-21: 776, Sep-21: 876, Oct-21: 942, Nov-21: 980, Dec-21: 1033

480 Cr — 2019-20

622 Cr — 2020-21

30% Increase in COVID year

Total Expenditure on maintenance

Awards and Recognition so far

Gold Award Winners for Skoch Awards 2020

Silver Award Winners for National Awards for eGovernance 2021

Award of Appreciation, 19th CSI SIG eGovernance Awards 2021

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