Analytics: Empowering Operations @ UIDAI

Unique Identification Authority of India (UIDAI)

www.uidai.gov.in

Delhi, 26th December 2012

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1. Project Overview: Context, features and implementation
2. Aadhaar as a Service Delivery Platform
3. Data Analytics @ UIDAI
4. Applications of Data Analytics: Few Examples
5. Sharing Data for further research

PROJECT OVERVIEW

Context of UIDs in India

- Provision of a robust, reusable ID to those who do not have any ID proof

- To clean up existing databases through Uniqueness

- Improve Targeting and Delivery of Services

- Reduce cost of Delivery of Services

AADHAAR

Aadhaar – The Foundation

ID Projects have usually been created for security / immigration objectives, however **<u>Aadhaar</u>** is a developmental initiative.

UIDAI's Mandate

Provide Unique ID Number to all Residents

Enrolment is a one time process for the resident

Establishes Uniqueness

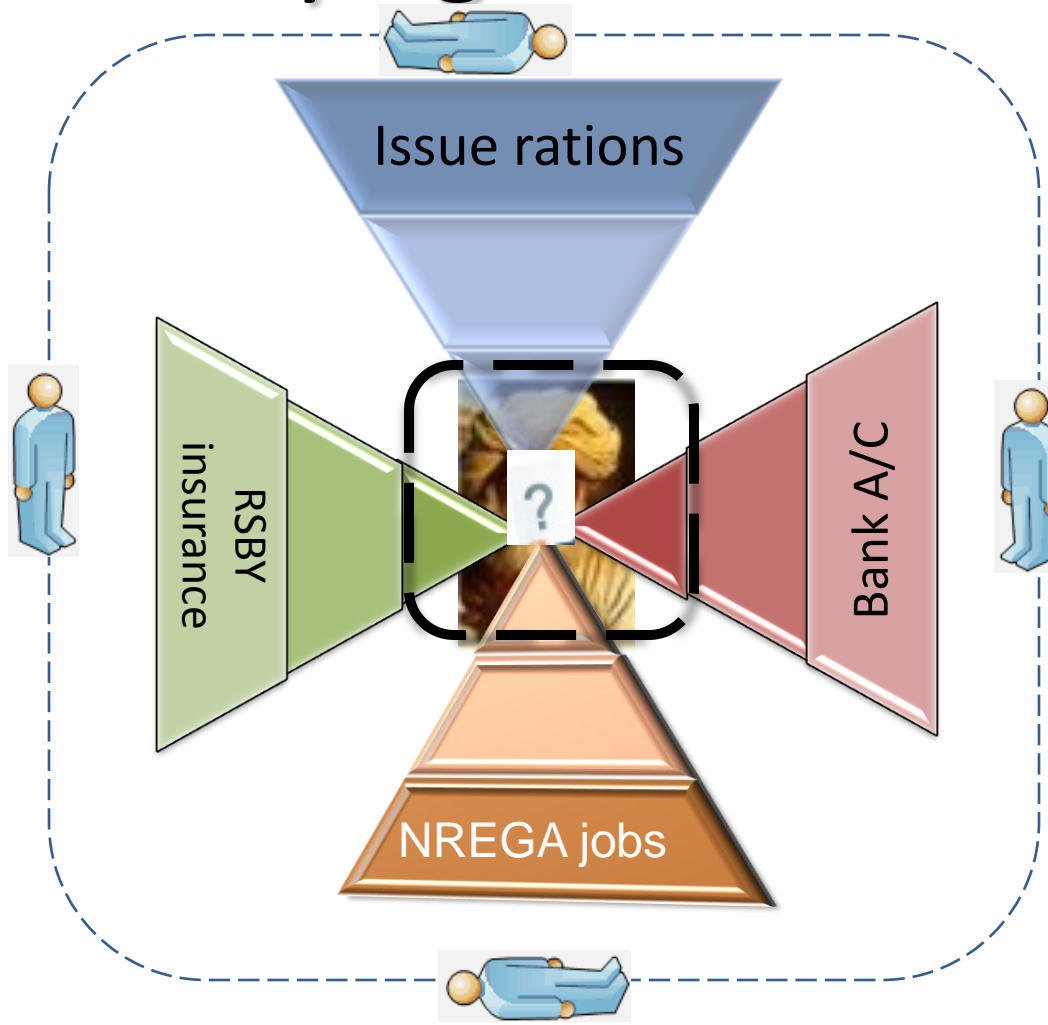## Define usages and applicability of Aadhaar for delivery of various services

Online Authentication services are designed to serve this mandate

Online Authentication Establishes identity

Authentication is transactional and done at the time of availing a service

AADHAAR

Verifying ID is a common challenge

Issue rations

RSBY insurance

Bank A/C

NREGA jobs

?

Multiple service providers, same resident!

ID document ≠ ID

Establishing ID – poor man's problem

Birth records ✖
Address proof ✖
Money to 'beat' the system ✖
Poverty Premium

AADHAAR

ID is the only focus of UIDAI

Issue rations

RSBY insurance

Cooking gas

1568 3647 4958 6218

NREGA jobs
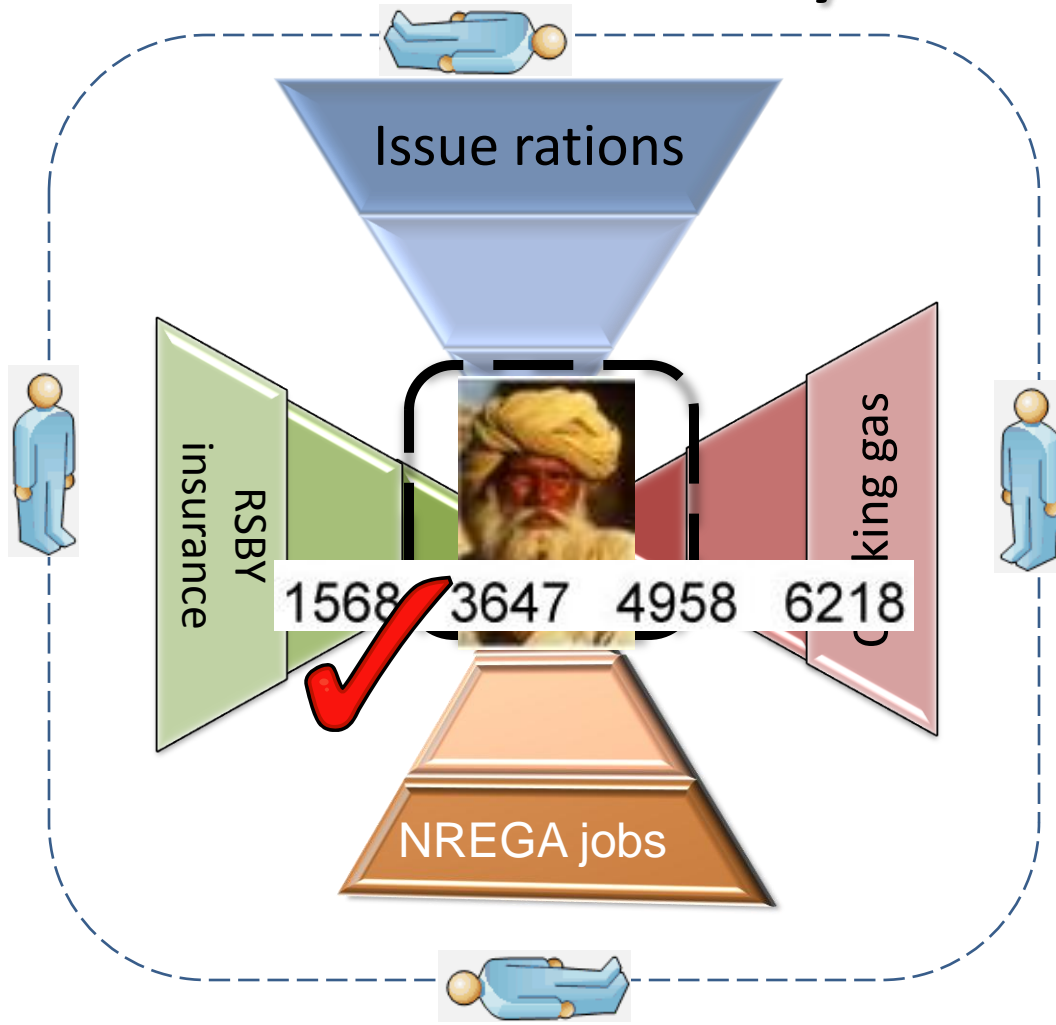
UID is just an instrument

Guarantee to identity

No guarantee to rights

No guarantee to entitlements

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AADHAAR

Features of Aadhaar

Only Numbers – No Cards

Random Numbers – No Intelligence

Standard Attributes – No Profiling

All Residents – Including Children

No Guarantees to Rights, Citizenship Entitlements

Uniqueness – Ensured through biometric attributes
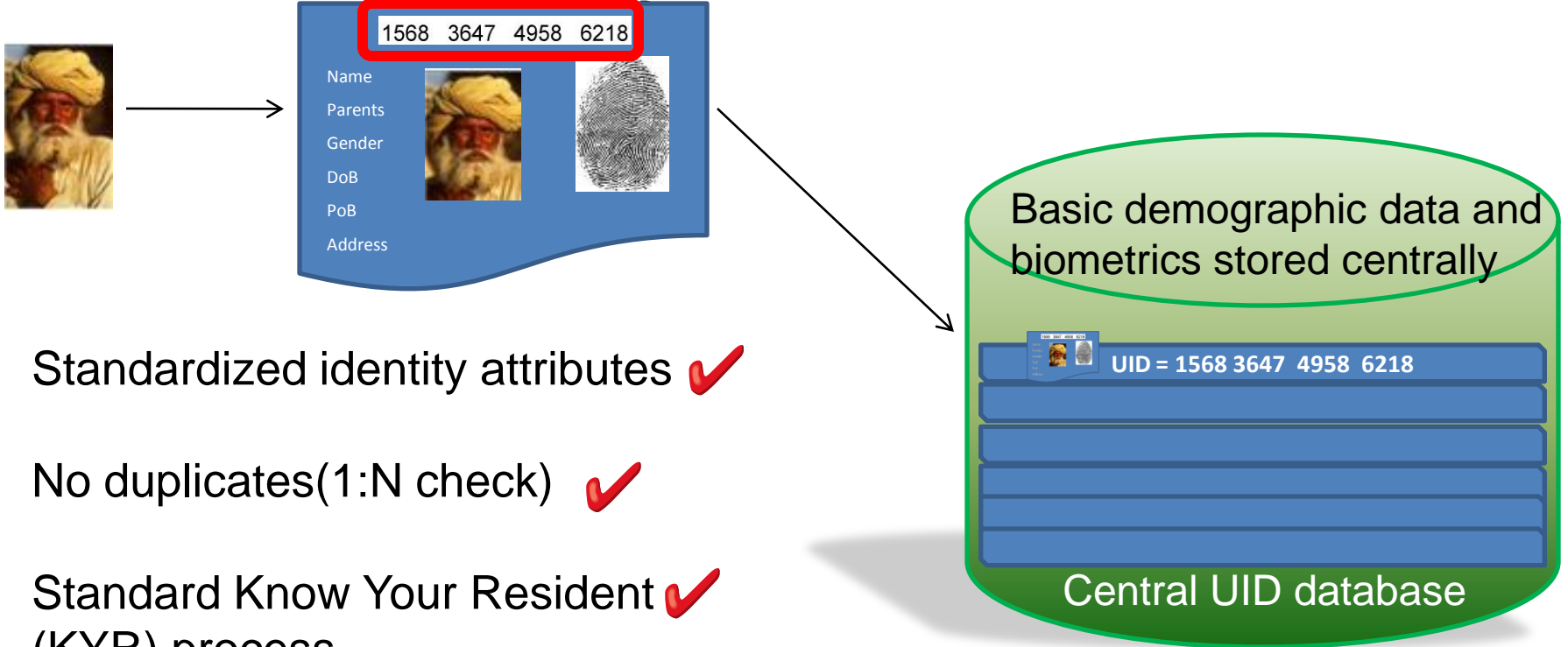
De-novo creation of database

Ubiquitous Authentication – anytime any where

Ensuring Security and Privacy of Information

AADHAAR

UIDAI will issue unique IDs …

UID ⇔ Unique number ⇔ Random number

1568 3647 4958 6218

Name
Parents
Gender
DoB
PoB
Address

Basic demographic data and biometrics stored centrally

UID = 1568 3647 4958 6218

Central UID database

Standardized identity attributes ✔

No duplicates(1:N check) ✔

Standard Know Your Resident ✔
(KYR) process

AADHAAR

4 demographics + 3 biometrics = 1 unique Aadhaar number

Name

Address

Gender
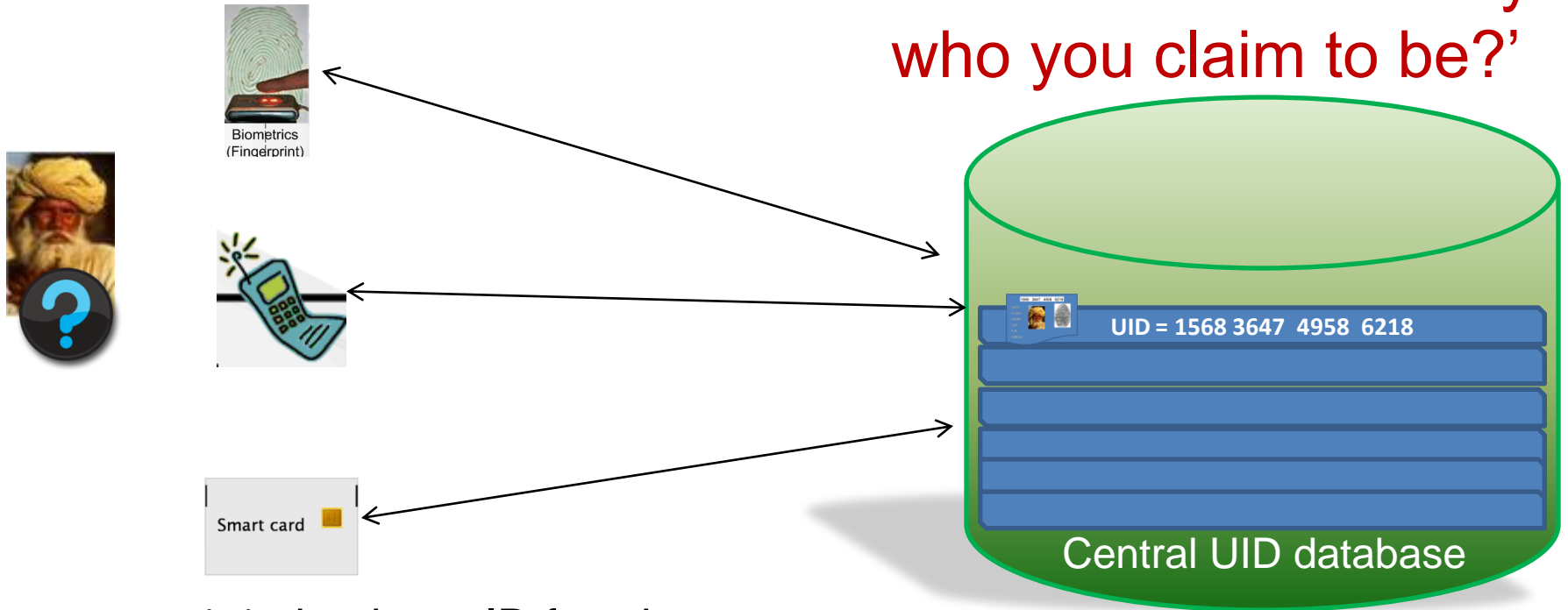
Date of birth

+

Photo

Both iris

10 finger-prints

=

1 person ⇔ 1 number

… and authenticate IDs online, real-time

Authentication - 'Are you who you claim to be?'

Biometrics
(Fingerprint)

Smart card

UID = 1568 3647 4958 6218

Central UID database

✔ 1:1 check, no ID fraud

✔ Only YES/NO response, no details – no invasion of privacy

✔ Person can see self-details, no one else can

AADHAAR

Information Collected

KYR Fields – Name, Address, Gender, DOB
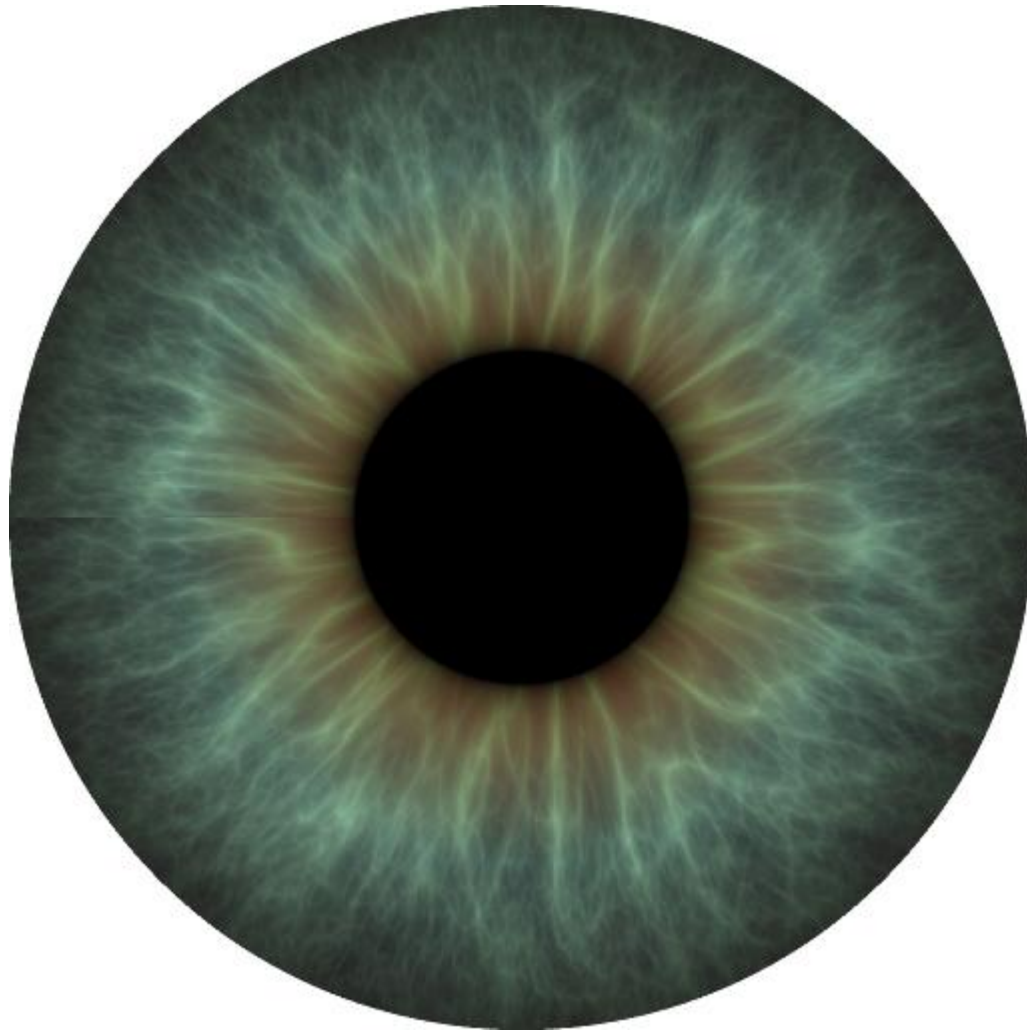
Photo & Address Verification
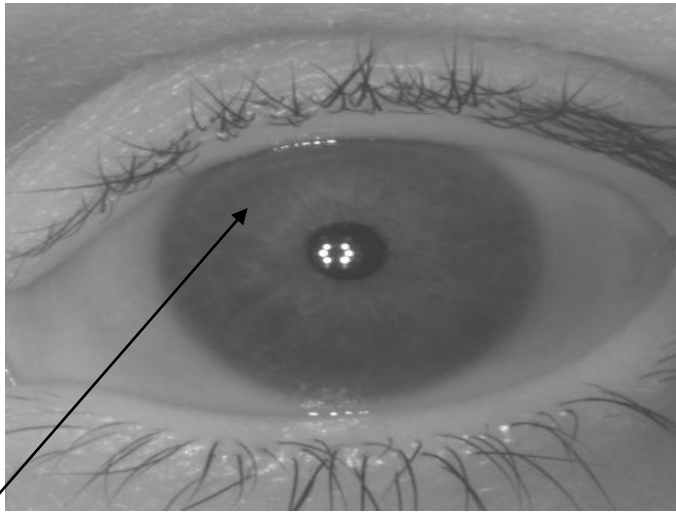
Photo

10-fingerprints on Slap scanner

Iris Scan

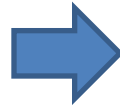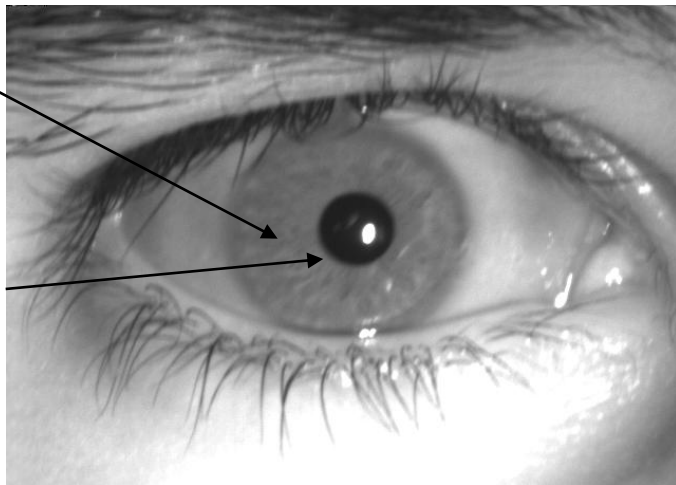AADHAAR

Each iris has a unique pattern

1024 digit number

Iris

Pupil

1024 digit number

AADHAAR
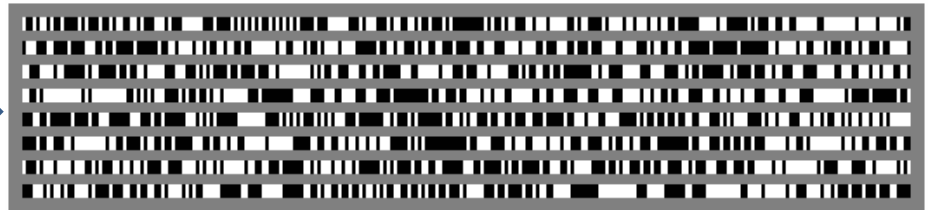
30+ minutiae extracted from <u>each</u> fingerprint
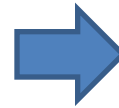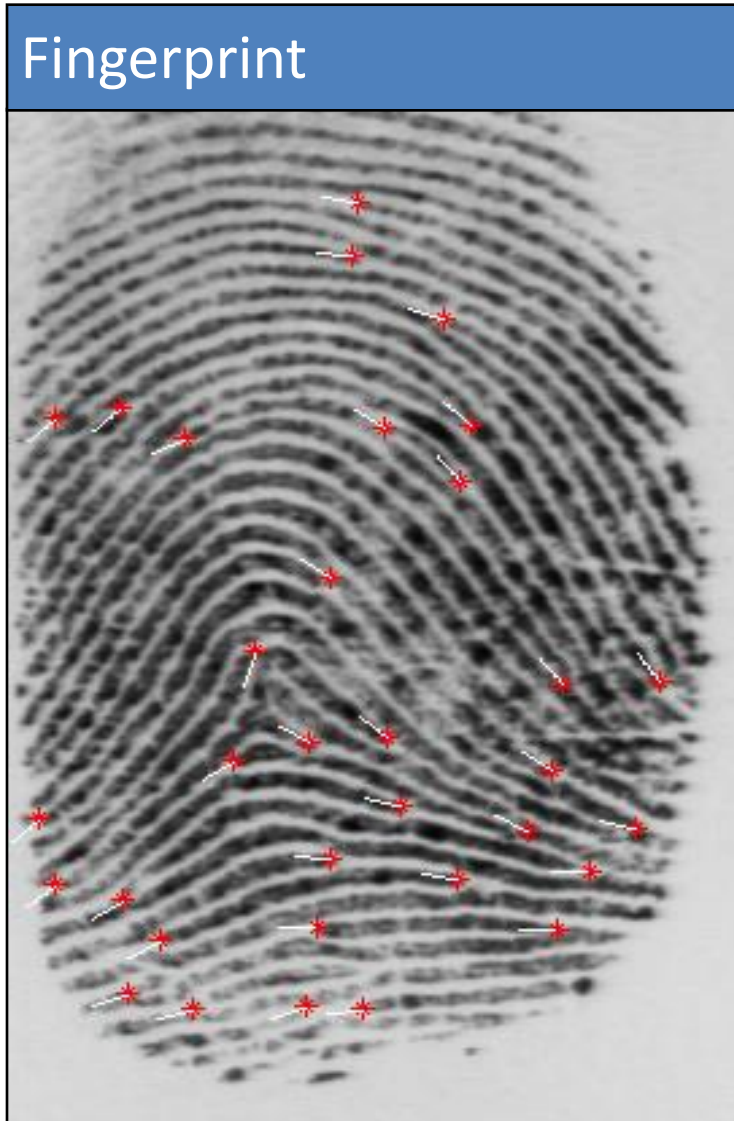
Number	X Coordinate	Y Coordinate	Angle
1	43	312	328
2	18	306	323
3	12	280	320
4	57	328	331
5	84	257	328
6	92	214	108
7	66	130	336
8	42	118	140
9	18	122	320
10	128	58	187
11	130	37	11
12	162	83	19
13	172	125	222
14	140	126	34
15	168	147	230
16	120	185	214
17	206	227	230
18	202	261	214
19	193	285	208
20	167	304	191
...	...	...	...

AADHAAR

UIDAI defines and manages the two basic pillars of identity management..

Aadhaar Enrolment

Aadhaar Authentication

AADHAAR

.. & facilitates the ecosystem to enable reach & adoption..

Aadhaar Enrolment

| Service Delivery Agencies – Registrars/AUAs |
| Empanelled Enrolment Agencies |
| People Training & Certification Agencies |
| Monitoring & Audit Agencies |
| Consultants & Software Developers |
| Device Ecosystem |
| Network Providers & ASAs |
| Contact Centre |
| Technology Partners |

Aadhaar Authentication

AADHAAR

..to catalyze improved outreach of service delivery to the residents

Efficient & Transparent Service Delivery

Include the Marginalized

Cleaning Up Databases

Financial Inclusion

Aadhaar Enrolment

Aadhaar Authentication

Service Delivery Agencies – Registrars/AUAs

Empanelled Enrolment Agencies

People Training & Certification Agencies

Monitoring & Audit Agencies

Consultants & Software Developers

Device Ecosystem

Network Providers & ASAs

Contact Centre

Technology Partners

AADHAAR

Over-arching Goals and Design Choices

- Inclusion
- Scalability
- Cost
- Speed

- Open Source
- Platform
- Standards
- Inter-operable

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Aadhaar Technology Highlights

- Aadhaar is the largest biometric identity system in the world!

- Unprecedented scaling requirements

  - The biometrics in every new enrolment packet coming today is compared against biometrics of 230+ million residents!!

- End to end data and system security and non-repudiation built-in

- Completely built on open standards and open source platforms

- Interoperability and vendor neutrality is not an after thought

AADHAAR

Aadhaar is an electronic Identity

- Unique
- Online
- Authenticable
- Portable
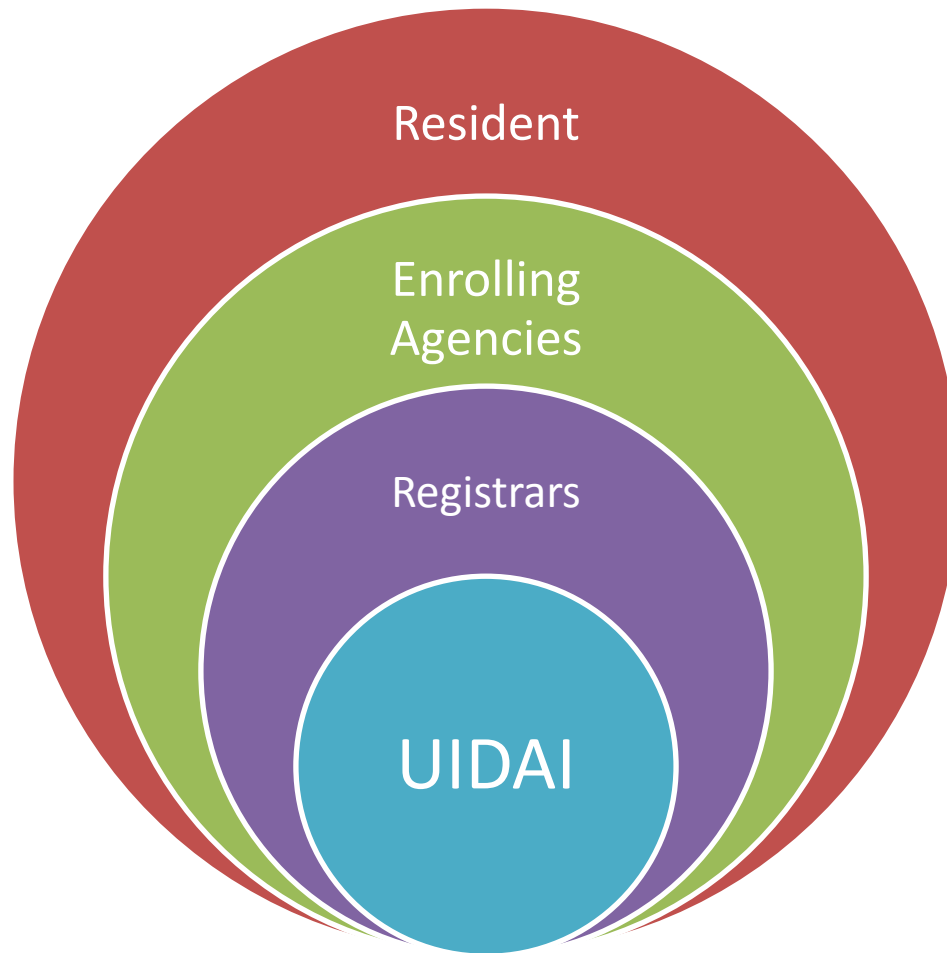- Pan-India
- Service Delivery Platform based

National Launch of Aadhaar

Aadhaar launched by PM and UPA Chairperson on September 29, 2010 in Nandurbar district, Maharashtra

Enrolment Ecosystem

Resident

Enrolling Agencies

Registrars

UIDAI

AADHAAR

Enrolment Kit

Item-wise description

1. Laptop with enrolment client

2. 2nd monitor for live data verification by resident

3. Camera for photo capture

4. Iris scanner

5. Fingerprint slap scanner

6. Enrolment kit box

AADHAAR

Enrolment Scale

# Challenges of scale and reach

Demand for Aadhaar ...

గ్రంథాలయము పనిచేయు కాలము
ఉదయం: 7-30 To 12-00. సాయంత్రం: 2-30 To 5-30.

www.uidai.gov.in

Aadhaar Letter

निर्देश
- आधार ओळखीचे प्रमाण आहे, नागरीकतेचे नाहीं.
- ओळखीचे प्रमाण ऑनलाइन ऑथेन्टीकेशन द्वारा प्राप्त करा.
- कोणत्याही प्रकारच्या मदतीकरिता :—
  फोन नं. 1800 180 1947 वर संपर्क करा, किंवा
  पी. ओ. बॉक्स नं. 1947, बँगलुरू—560001 वर पत्र पाठवा, किंवा
  help@uidai.gov.in वर ईमेल करा.
नोंधः मुलांचे 15 वर्षांचे वय झाल्यानंतर बायोमॅट्रिक
  वैशिष्ट्यांचे नूतनीकरण अवश्य करून घ्या.

INSTRUCTIONS
- Aadhaar is proof of identity, not of citizenship.
- To establish identity, authenticate online.
- In case any help is required :
  Call 1800 180 1947 or;
  Write to P.O. Box No. 1947, Bengaluru - 560 001 or;
  Email at help@uidai.gov.in

Note: Children on attaining 15 years of age
  need to update biometric information.

भारतीय विशिष्ट ओळख प्राधिकरण
UNIQUE IDENTIFICATION AUTHORITY OF INDIA

पत्ताः पहिला माळ,
सलारपुरिया टचस्टोन
मरथाहल्ली सरजापुर,
मरथाहल्ली सरजापुर,
बँगलुरू—560087

Address: 1st Floor,
Salarpuria Touchstone,
Marathahalli Sarjapur,
Outer Ring Road,
Bengaluru - 560087

Aadhaar - Aam Aadmi Ka Adhikaar

भारतीय विशिष्ट ओळख प्राधिकरण
भारत सरकार
Unique Identification Authority of India
Government of India

नोंदणी क्रमांक/Enrolment No.: 1234/5678/901234

To,
Pramod Kumar (प्रमोद कुमार)
1st Floor, Salarpuria Touchstone,
Marthahalli Sarjapur,
Outer Ring Road, Bangaluru,
Karnataka - 560 087
Karnataka - 560 087

Date: 14/04/2010

EY   1234565789   IN

तुमचा आधार क्रमांक / Your Aadhaar No. :
1234 4678 9011

आधार — सामान्य माणसाचा अधिकार

भारत सरकार
GOVERNMENT OF INDIA

रमेश कुमार
Ramesh Kumar
पिताः श्री प्रमोद कुमार
Father : Sh. Pramod Kumar
जन्म वर्ष/Year of birth : 2000
पुरूष   Male
1234 4678 9011

आधार — सामान्य माणसाचा अधिकार

AADHAAR

Logistics .. Reaching every resident in India
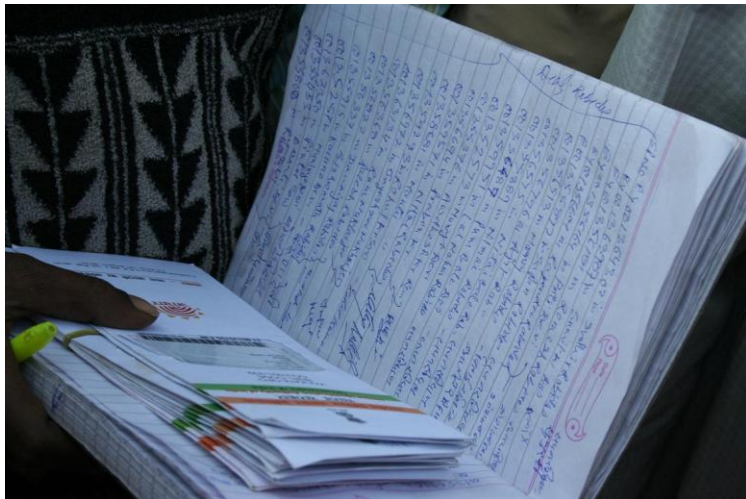
DATA CAPTURE

Relevance of Data Analytics

- Neutral & Objective
  - Facts validating opinion, increases confidence of team and management in pursuing directions
- Cost Economics
  - Automation in data collection
  - Quality of Insight – capability to understand trends across large sample space
- Empowers with Agility
  - New Initiatives and its impact can be analysed for rapid course correction.
  - Enables audit of large operations with details in low cost

Automated Meta-data Capture

- **Enrolment Packet**
  - Individual Screen Timings
  - People Involved
  - Geographical Location
  - Several Quality parameters
  - Devices
  - Date & Time of Operations
  - Any Exceptions
- Sync Operations
- Packet Upload
- Visual Quality Checking
- Biometric Uniqueness

- Aadhaar Generation
- Print Letter Generation
- Physical Letter Printing
- Letter Dispatch
- Confirmation / Return

- **Authentication**
  - Agency Involved
  - Type of authentication
  - Response Timings
  - Success/Failure
  - Failure Reasons

Dimensions of the Projects

- Scale
  - Geographically – Daily Operations across India
  - 25,000+ stations deployed

- Speed
  - ~1m/day mark reached in less than 18 months of 1stAadhaar Generated

- Operations Model
  - Public (Registrar) -Private (EA) partnership driven

Data Analytics plays a crucial role to provide <u>neutral</u> insight to UIDAI as well its partners.
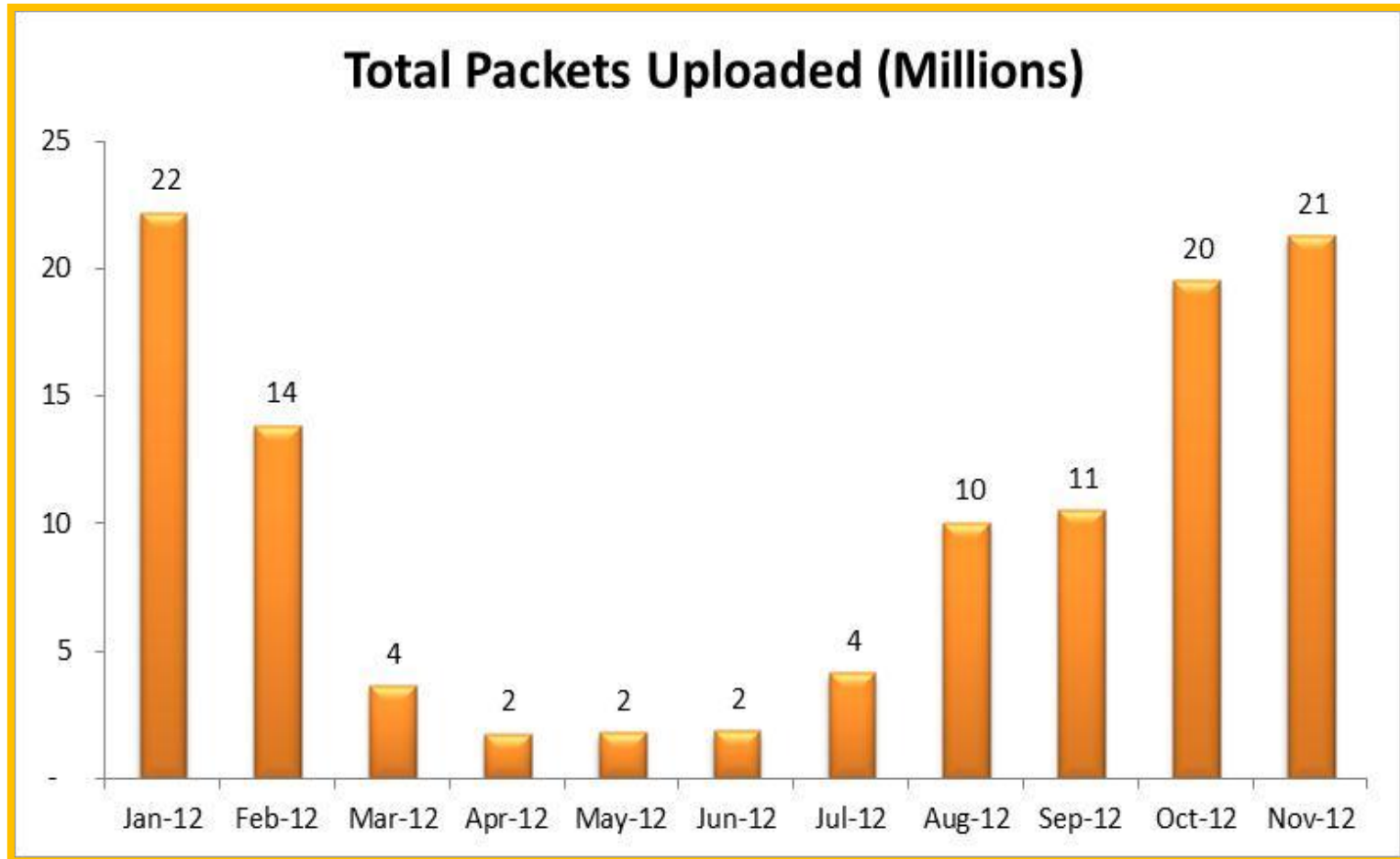
AADHAAR

DATA ANALYTICS CASE STUDIES @ UIDAI

CASE STUDY 1 – PACKET UPLOAD

AADHAAR

No. of Data packets Upload, to be monitored

Total Packets Uploaded (Millions)

Month	Value
Jan-12	22
Feb-12	14
Mar-12	4
Apr-12	2
May-12	2
Jun-12	2
Jul-12	4
Aug-12	10
Sep-12	11
Oct-12	20
Nov-12	21

AADHAAR

Monitoring & sharing the upload delay

Enrolemnt Agency	Av Upload Delay (
Strategic Outsourcing Service	40
IL&FS Ltd.	34
Virgo Softech Ltd.	32
Comat Technologies Pvt. Ltd.	32
eCentric Solutions Pvt. Ltd.	32
Eagle Press Pvt. Ltd.	32
i-Grandee SoftwareTechnologies	31
GSS America	30
Matrix Processing House	30
Madras Security Printers Ltd.	29
4G Identity Solutions	28
Tera Software Ltd.	27
Wipro Ltd	26
Smart ID	25
Smart Chip Limited	23
Alankit Assignments Ltd.	22
Datasoft Computer Services (P)	21
Delhi Integrated MMTS Ltd.	20

Monitoring the time-gap in upload of packets after enrolment, understanding implications of this delay on overall operations, enables policy and penalties to be defined to best suit the project.

AADHAAR
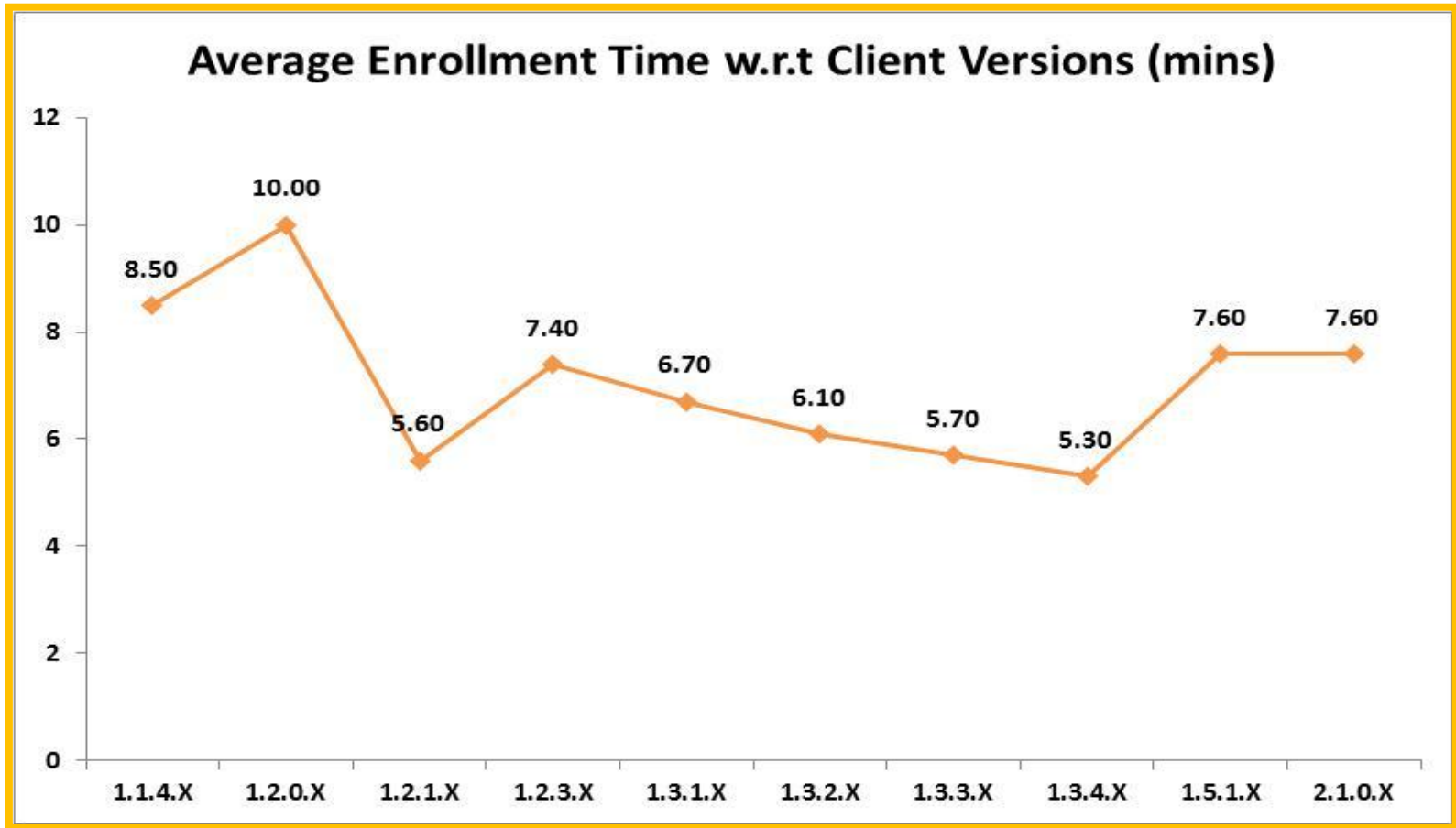
All India – Upload Time Delay (days)
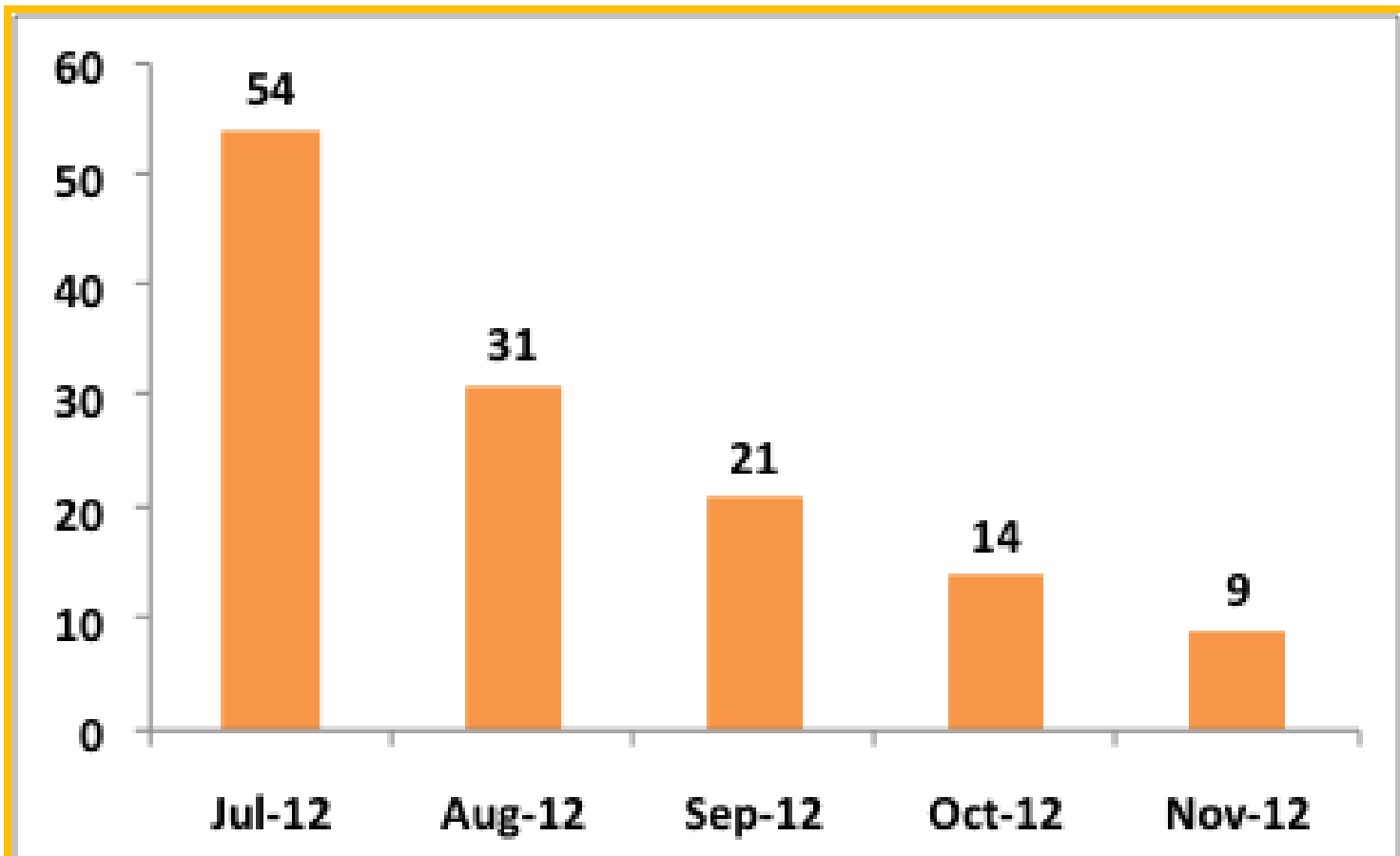
Monitoring & sharing packet upload delay information with partners, incorporating new policy initiatives, has led to significant improvement in minimising the delays.

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CASE STUDY 2 – MONITORING ENROLMENT TIME

Average Enrollment Time w.r.t Client Versions (mins)

Version	Time
1.1.4.X	8.50
1.2.0.X	10.00
1.2.1.X	5.60
1.2.3.X	7.40
1.3.1.X	6.70
1.3.2.X	6.10
1.3.3.X	5.70
1.3.4.X	5.30
1.5.1.X	7.60
2.1.0.X	7.60

Data Analytics empowers to differentiate the field reality from the rumors. Here we monitor, changes to enrolment time with changes in software version to evaluate between software improvement to economic viability for partners and resident time involvement.
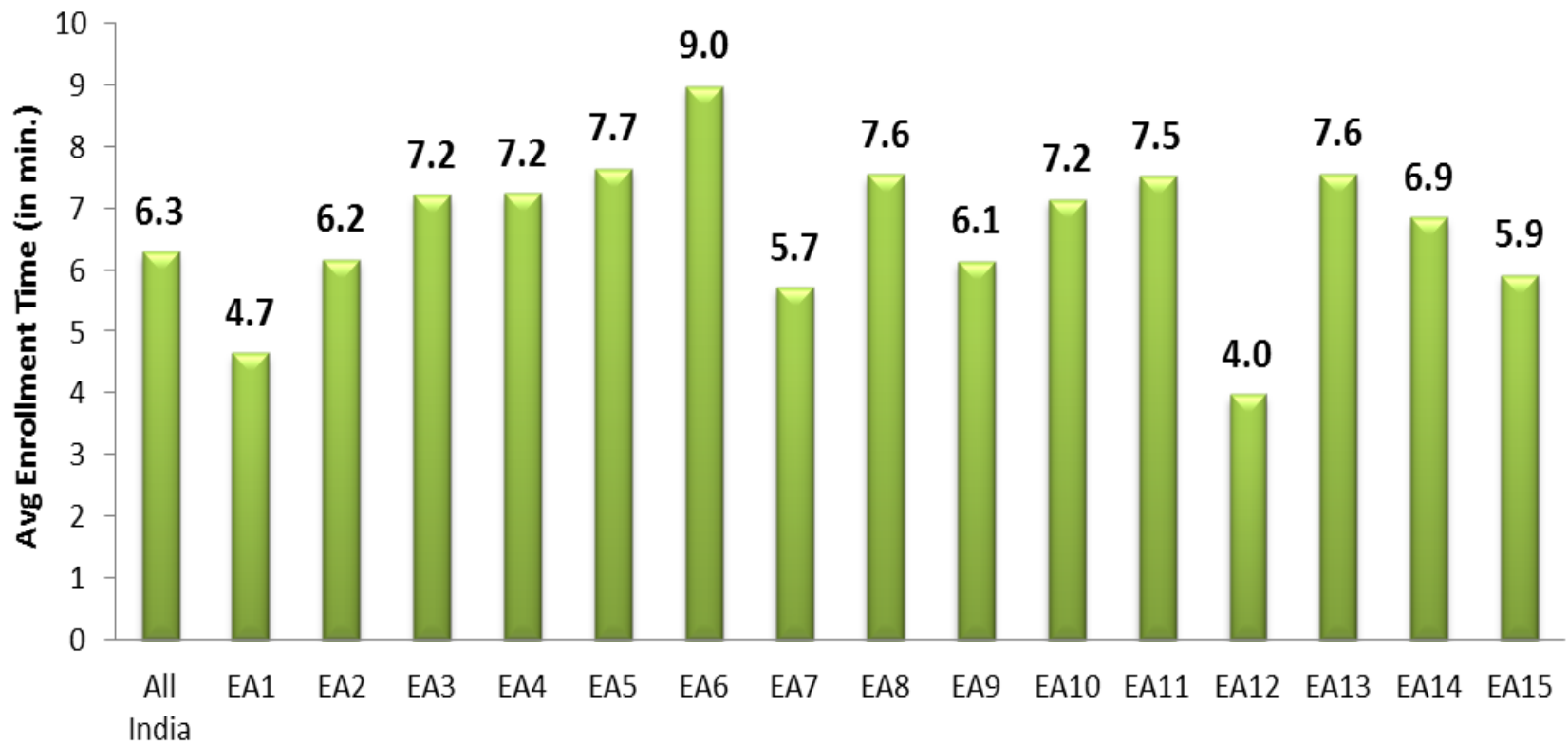
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Distribution of Enrolment Duration(min)
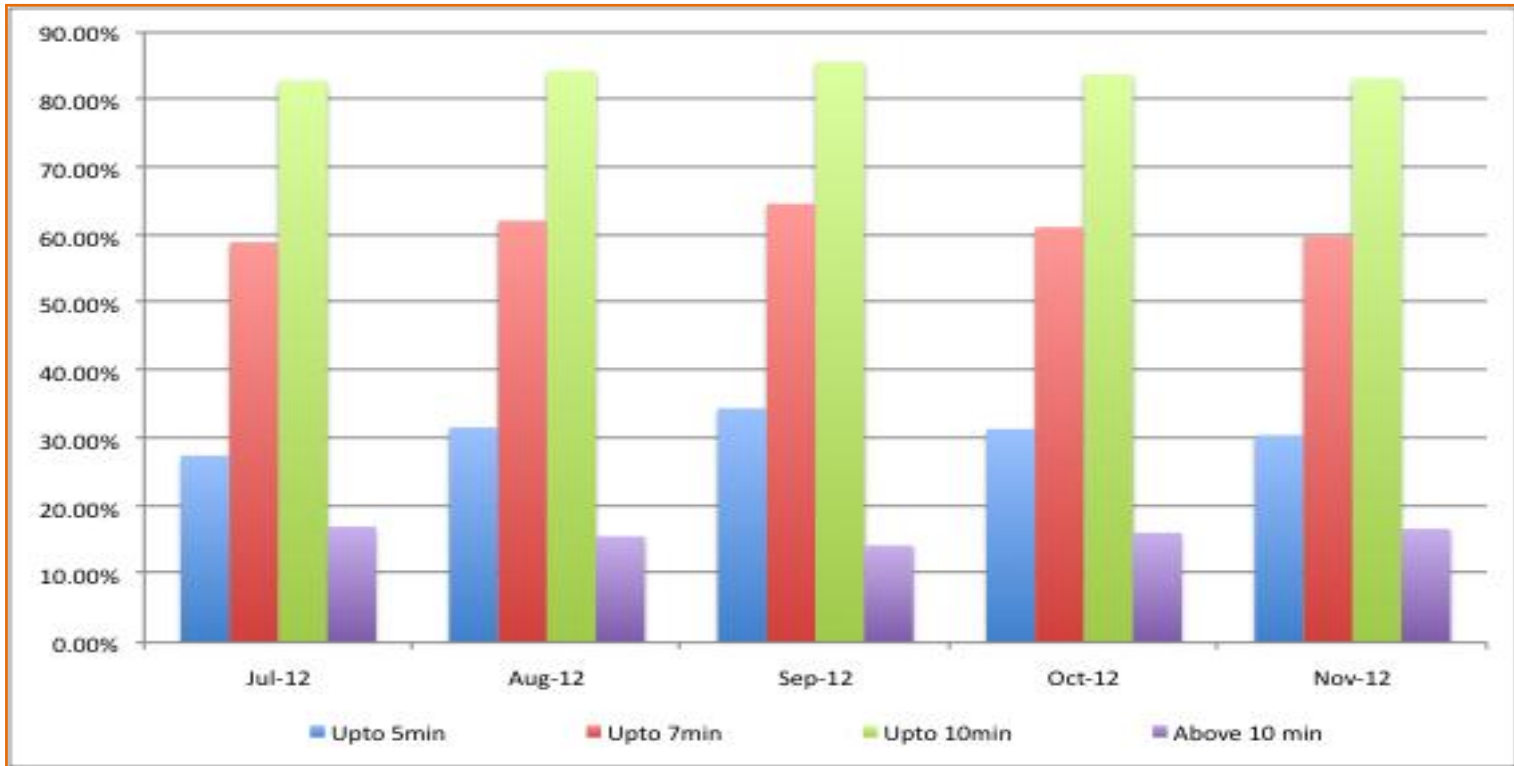
Deep-dive analysis on enrolment time, further provides insight on majority of enrolment cases versus few outliers cases.

*sample size is 20-55Lac enrolments in each month

Top 15 EAs based on Enrollments Processed

Bar chart — Avg Enrollment Time (in min.):

	All India	EA1	EA2	EA3	EA4	EA5	EA6	EA7	EA8	EA9	EA10	EA11	EA12	EA13	EA14	EA15
Avg Enrollment Time	6.3	4.7	6.2	7.2	7.2	7.7	9.0	5.7	7.6	6.1	7.2	7.5	4.0	7.6	6.9	5.9

- **Av Enrolment time among the top EA's is spread between 4-9 min.**
- **Impact of Agency's Involvement, operator training etc brings in efficiency**

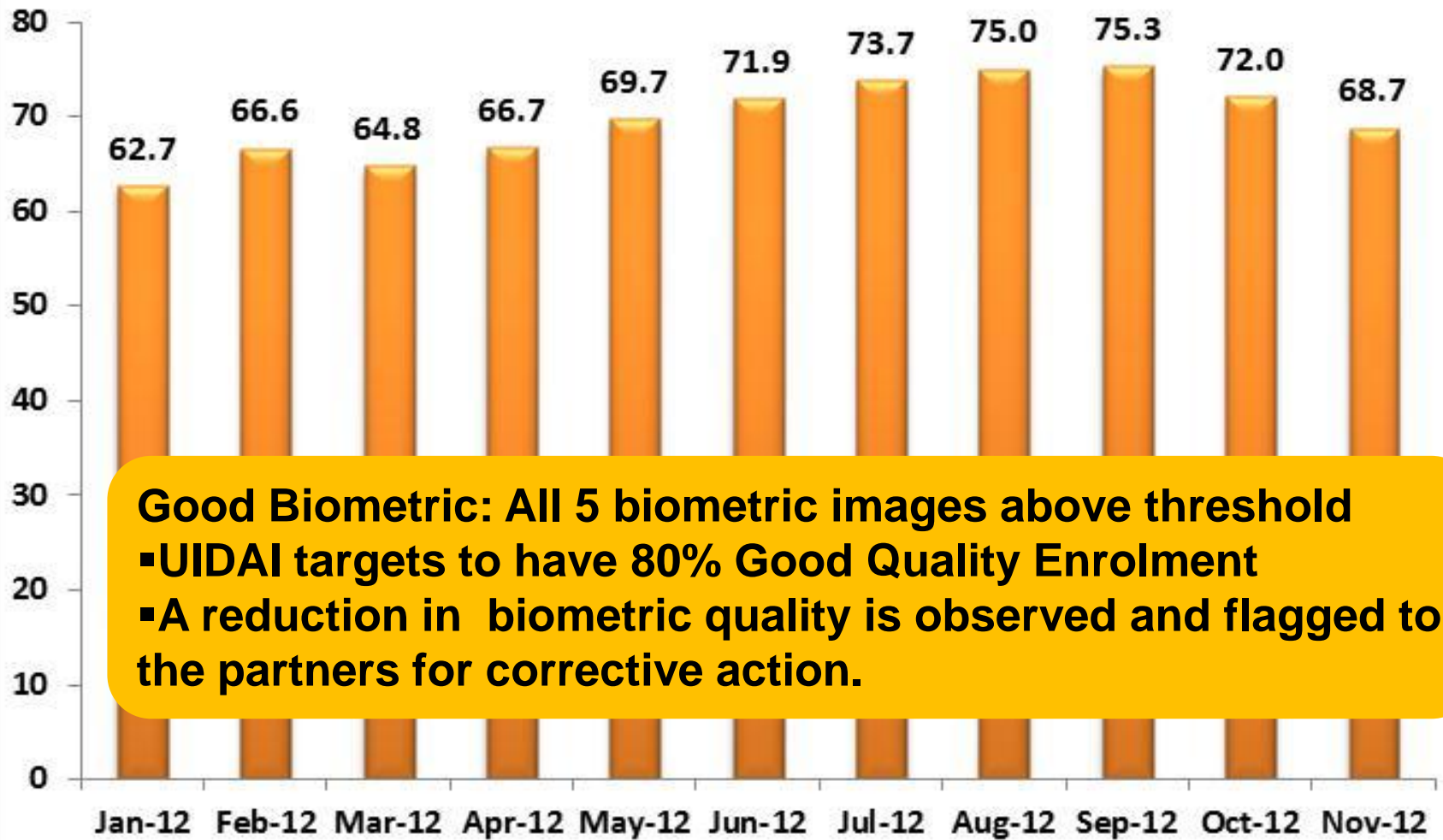*based on Jun-Nov 2012 Enrolments

AADHAAR

CASE STUDY 3 – MONITORING QUALITY

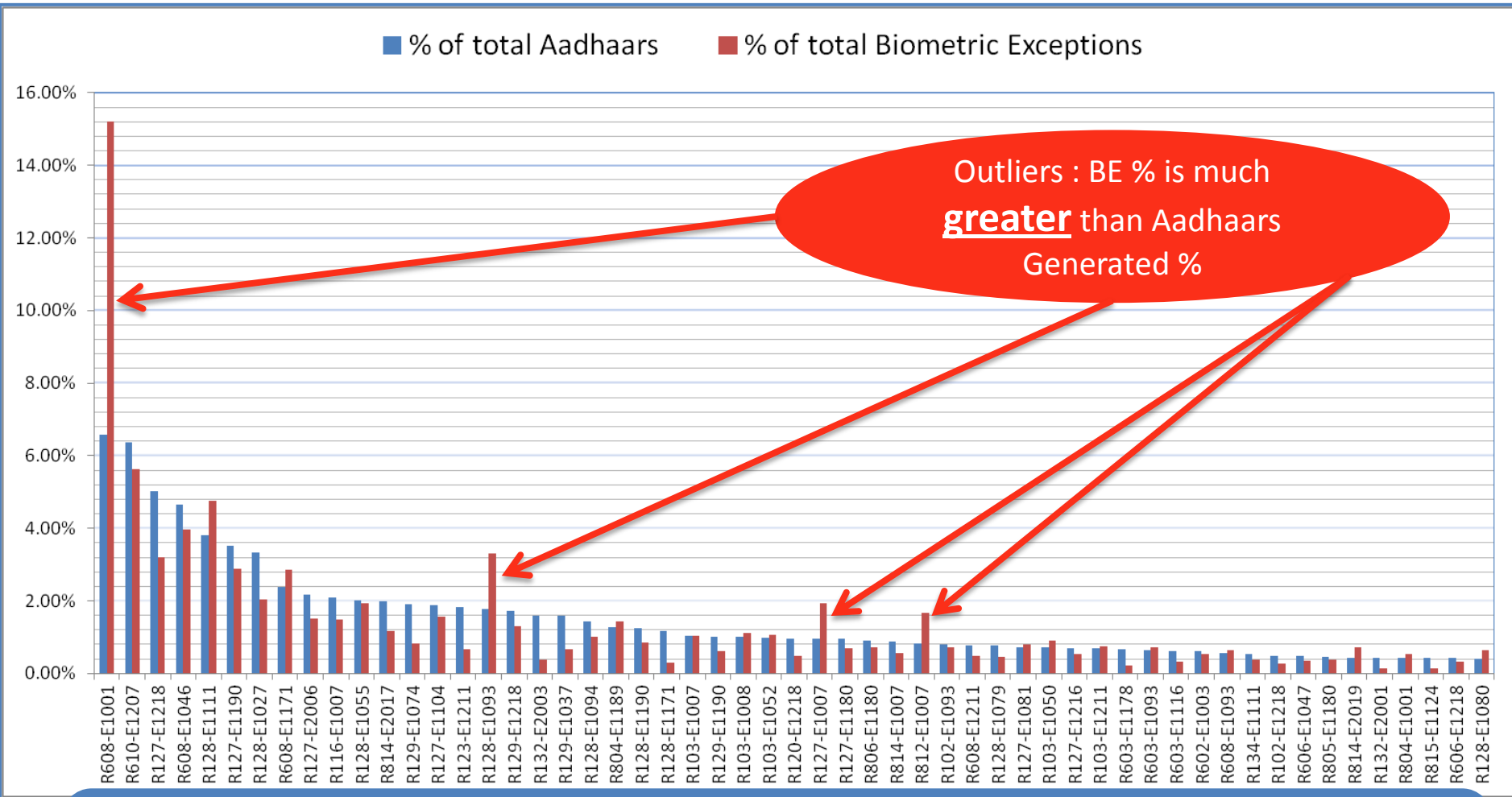# Demographic Error % with & without RGI
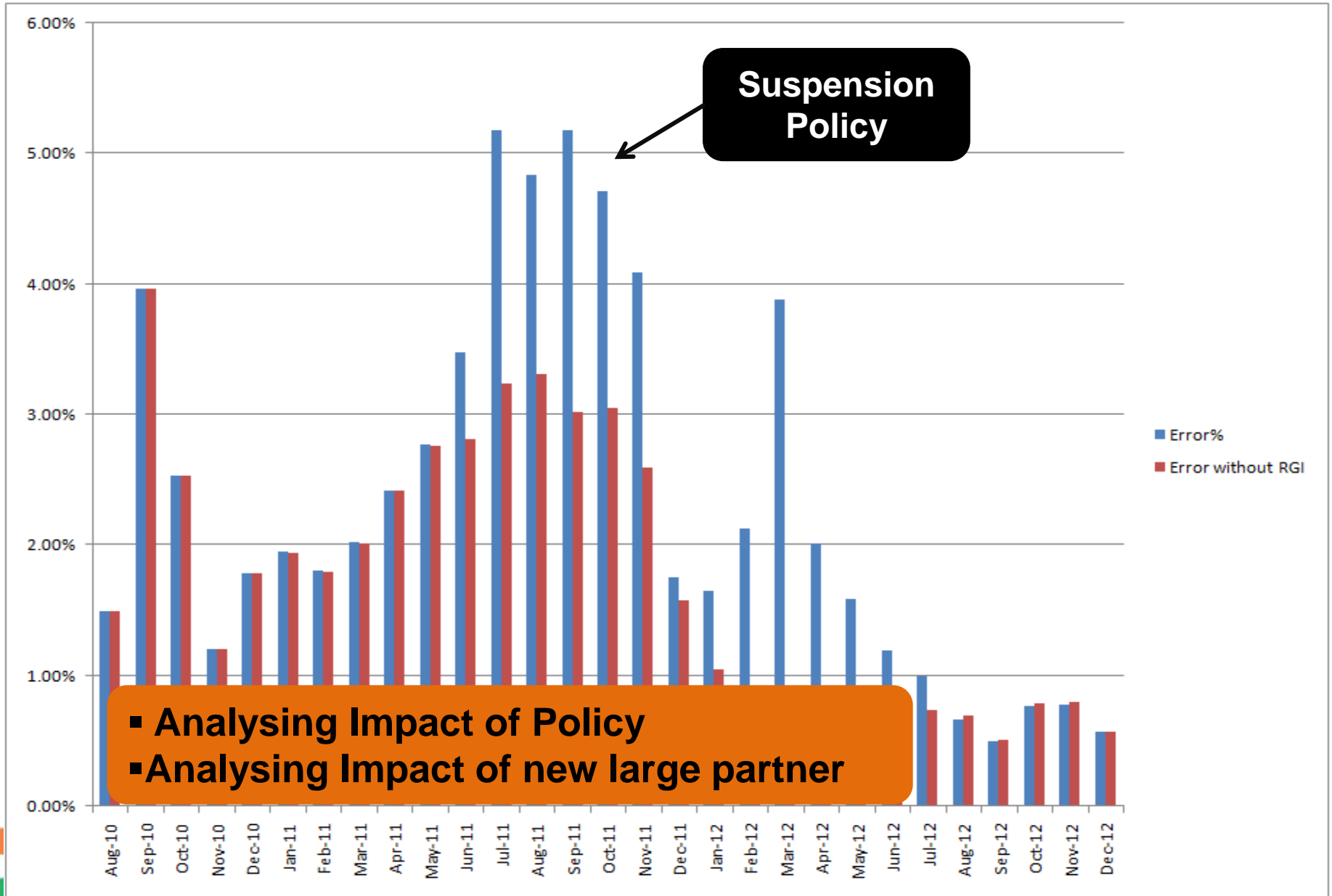
Good Quality Enrollments%

Good Biometric: All 5 biometric images above threshold
▪UIDAI targets to have 80% Good Quality Enrolment
▪A reduction in biometric quality is observed and flagged to the partners for corrective action.

AADHAAR

CASE STUDY 4 – EMPOWERING PARTNERS IN PROCESS COMPLIANCE OF FIELD OPERATIONS

Comparing distribution of Aadhaar & Biometric Exception (BE)

% of total Aadhaars   **% of total Biometric Exceptions**

Outliers : BE % is much **greater** than Aadhaars Generated %

Empowersthe management toidentify areas where detailed audit is required.

AADHAAR

BE Cases – detailed analysis

Daily Operator Report

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
	Agency Code	Agency Name	Registrar_Code	Registrar Name	Operator Id	Operator Name	Packet Processing Completion Date	Aadhaar Generated	Aadhaar Rejected	No of BE	No of All Biometric Missing	No of All fingers Missing Enrolments	No of both Iris Missing Enrolments	No of Midnight Enrolments	EOD Reviews done	No of Supervisor as Operator Enrolments	QA Rejects	Gender Photo Mismatch	Age Photo Mismatch	Poor Quality Photograph	Name Address Error	Name Address Translation error	Relationship Mismatch	Incomplete Address	Demographic Dedup	Policy Rejects	No of Enrolments with Enrolment
2	1218	Wipro Ltd	129	of Karna	P_00649	Sreena	6/30/2012	4	1	0	0	0	0	0	5	0	1	0	0	0	0	0	0	0	1	0	
3	1218	Wipro Ltd	129	of Karna	P_00033	Altham	6/30/2012	3	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
4	1218	Wipro Ltd	129	of Karna	P_00720	Yathish	6/30/2012	2	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	
5	1218	Wipro Ltd	129	of Karna	P_00430	Manu	6/30/2012	2	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	
6	1218	Wipro Ltd	129	of Karna	P_00392	Manjul	6/30/2012	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	
7	1218	Wipro Ltd	129	of Karna	P_00641	Malash	6/30/2012	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	

Based on field investigations, a report is**designed** and generated daily, providing information at operator level, on Biometric Exceptions, Demographic Errors, Mid-night Enrolments etc to conveniently monitor field by the partners.
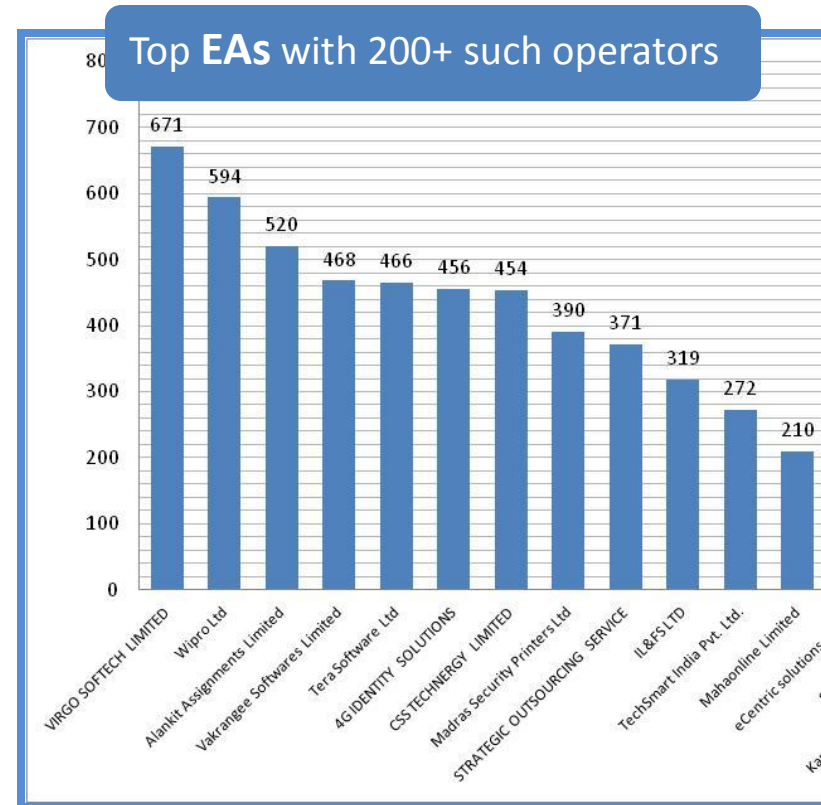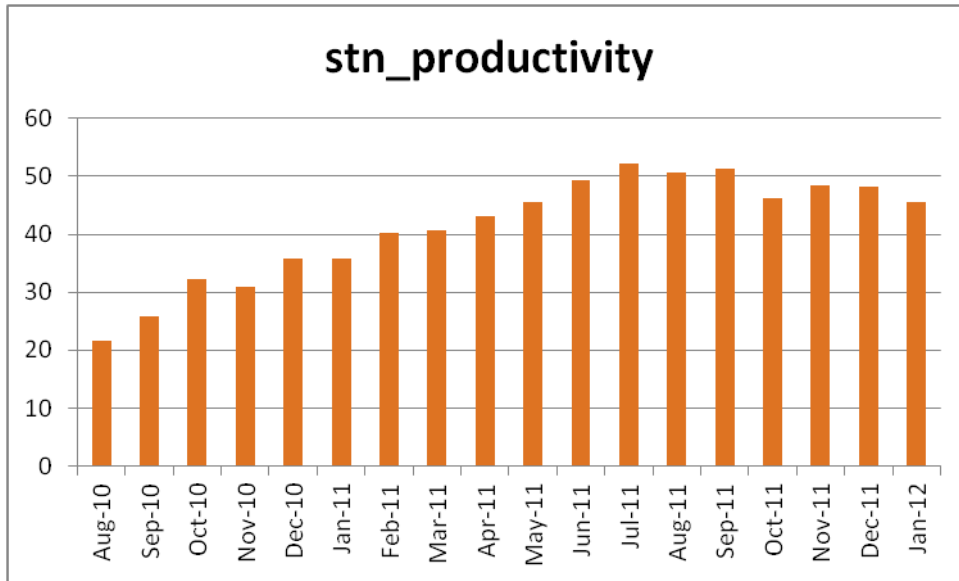
AADHAAR

Biometric Exception as a % of Enrolment
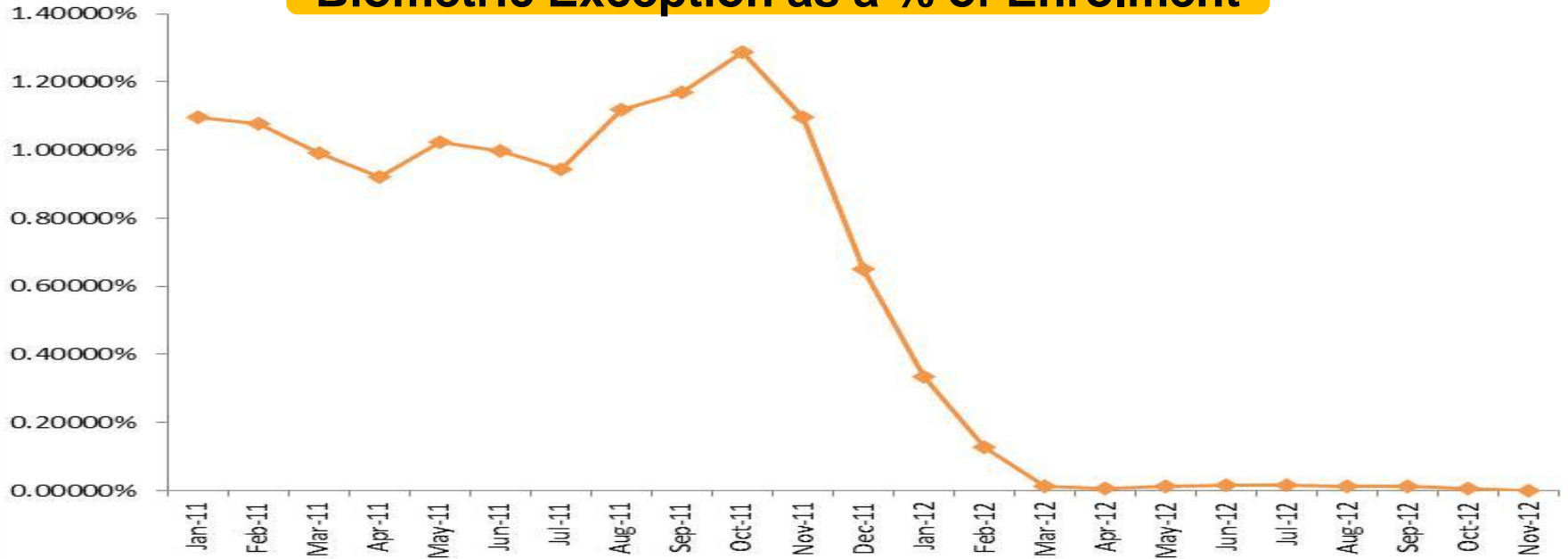
- **Monitoring and awareness has lead to reduction in dubious Bio-Metric exceptions cases.**
- **Awareness is maintained with partners, that this monitoring should not lead to exclusion of genuine Biometric Exception Cases**
- **Aadhaar is always stretched itself to be as inclusive and resident friendly as possible.**

AADHAAR

Comparing Station & Operator Productivity
Fast operators > 150 Enrol /day

stn_productivity

Top **EAs** with 200+ such operators

671, 594, 520, 468, 466, 456, 454, 390, 371, 319, 272, 210

VIRGO SOFTECH LIMITED, Wipro Ltd, Alankit Assignments Limited, Vakrangee Softwares Limited, Tera Software Ltd, 4G IDENTITY SOLUTIONS, CSS TECHNERGY LIMITED, Madras Security Printers Ltd, STRATEGIC OUTSOURCING SERVICE, IL&FS LTD, TechSmart India Pvt. Ltd., Mahaonline Limited, eCentric solutions

Convenient comparisons highlighting potential process violation scenarios. A case of operator doing parallel enrolments

AADHAAR

Weekly Parallel Enrolment Report

Operator Code	Operator Name	No. of Enrolments processed	No. of Aadhaars generated	No. of Enrolments rejected	No. of Parallel Enrolments Done	No. of Stations Used
Registrar - Registrar General India BEL2						
Agency - ABC LIMITED						
Enrolments processed from 2012-12-03 00:00:00 to 2012-12-09 23:59:59						
20073316112	Nishanth N	807	0	807	261	11
20073316519	Saravanan A	1233	77	1156	179	13
20073316137	Gopalakrishnan	750	10	740	176	9
20073316518	Balamurugan S	511	181	330	170	11
2.00733E+11	N.Kalpana	274	273	1	114	4
20073316118	Lakshmi P	502	7	495	82	4
20073316501	R Sathish	231	11	220	71	2
20073316095	E. Vignesh	113	95	18	64	7
20073316058	D Karthik	179	152	27	60	4
20073316096	A. Leo Paulrai	156	121	35	57	3
						2
						6
						5
						1
						3

Partner are empowered with relevant data to enable corrective action in the field.

AADHAAR

SHARING DATA @ UIDAI

Sharing Data @ UIDAI

- Periodic MIS Reports

- BI Software – Pentaho – Open Source

- Presenting Analytics Findings in Internal Review & Technical Review Meetings

- Conducting Workshops with External Partners to share Analytics Findings

- We welcome researchers as Volunteers, Sabbatical and Interns

- Creating Platforms for research to utiliseannonymised data.

Public Data Sharing
https://portal.uidai.gov.in/

Public Data Sharing

- GoI has notified the "National Data Sharing and Accessibility Policy (NDSAP)" in March 2012

- Datasets pertaining to Enrolment are available through the UIDAI data portal

- Data can be accessed manually as well as Programmatically

https://data.uidai.gov.in

	Dataset		Frequency
1	Aadhaar Generated by State, District	Enrolment	Daily, Incremental
2	Aadhaar Generated by Registrar-EA	Enrolment	Daily, Incremental
3	Aadhaar Generated by Gender &Age band	Enrolment	Daily, Incremental
4	Enrolments processed in detail	Enrolment	Daily, Incremental
5	Total Aadhaar Generated	Enrolment	Daily, Cumulative

Thank You