

NATIONAL RURAL EMPLOYMENT GURANTEE ACT (NREGA)

ICT PILOT PROJECT

Smart Card and Handheld Devices

CONCEPT NOTE



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NREGASoft
<http://nrega.nic.in>



MINISTRY OF RURAL DEVELOPMENT
DEPARTMENT OF RURAL DEVELOPMENT
GOVERNMENT OF INDIA

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I. EXECUTIVE SUMMARY:

In view of enormous size of the NREGA programme it is necessary to make best use of latest Information and Communication Technologies (ICT). This will not only help in ensuring effective implementation and proper management of the Programme but will also bring transparency and thereby credibility. Since it is a right based programme, Smart Cards / Hand held devices can be used as IT tool to ensure rights and entitlements. Smart Cards have the potential to capture details of the Workers, Work and Wages (WWW) including the muster rolls and the job cards.

Many states have started use of smart cards and hand held devices for the wage disbursement like Tamil Nadu, Karnataka, Andhra Pradesh, Bihar, Orissa, UP, Kerala, etc. To extend the current use of smart cards and hand held devices from wage disbursement to make it operate like a Job card so that all transactions of NREGA programme be captured, like demand for work, issue of dated receipt, allotment of work, entry into muster roll like attendance from the field through hand held devices which will be able to record latitude and longitude of the area, ensuring presence of worker at the worksite and payment either through '*branchless banking*' by adopting the Business Correspondent Model and using biometric based technology or through ATMs.

Smart card and hand held devices will have additional advantage of capturing delays. All transactions will be updated instantly in the MIS and accessible to the beneficiaries as well as the public. It will also enhance the management and monitoring of the Programme.

Hence, it is proposed that a pilot project for smart cards and hand held devices which captures all the transactions of NREGA along with the wage disbursement may be initiated to begin with in States like Andhra Pradesh, kerala, UP, Bihar and Orissa.

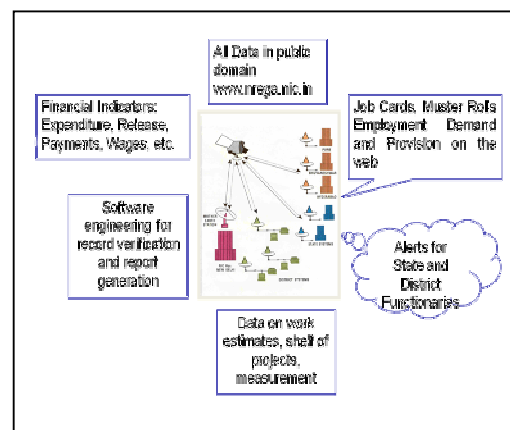
Note: *The entire concept note provides illustration of the technology and processes that may be adopted. This however does not imply that pilot projects taken in State should rigidly adhere to the technology, procedure and processes illustrated in the concept note. The State government may use there own discretion to implement the project using the most appropriate technology options considering the local circumstances.*

II. BACKGROUND:

With a view to providing guaranteed employment to rural house hold of the country who volunteers to do unskilled manual work in their native places, National Rural Employment Guarantee Act was enacted on 2nd February 2006. Initially the programme was taken up by the Ministry of Rural Department (MORD), Government of India, in 200 districts which was extended to additional 130 districts in April 2007 and thereafter to the remaining 285 districts of the country in April 2008.

However, in view of enormous size of the programme it is necessary to make best use of latest Information and Communication Technologies (ICT). This will not only help in ensuring effective implementation and proper management of the Programme but will also bring transparency and thereby credibility.

NREGA has used ICT to develop an online MIS – ‘NREGASoft’: <http://nrega.nic.in> and Knowledge Network: for creating an e-community of practioner innovation forged at site. NREGA MIS is comprehensive web-based system placing all data in public domain like worker’s entitlements, work data, fund flow from top to bottom, data software engineered, for cross verification of records and report generation and data analysis for consistency and Alerts for all functionaries. More than 5 Crore Job cards and 80 Lakh Muster rolls are on the public domain.



But since all entries have to be done manually after the event has taken place, it is an online transaction based system but not real time system. It does not allow the illiterate person to directly access the system.



Keeping in view the above objective, MORD may roll out its product as part of its Financial Inclusion initiative. With this all transactions will instantly go on record and be accessible to the beneficiaries as well as the public. It will also enhance the management and monitoring of the Programme.

III. OBJECTIVE / PURPOSE:

The pilot project seeks to identify the best technology options available for using ICT for NREGA MIS.

Apart from capturing details of the Workers, Work and Wages (WWW) the objective of is to promote transparency in the system, allow even the illiterate person to directly access the system, plug the leakages and pilferages, digitize the information in real time and facilitate efficient and effective financial inclusion.

Since the final beneficiary will be the wage seeker it will not be just a smartcard or and hand held devices but a e-governance model that will be people friendly and will empower the wage seeker to assert his/her right.

The Smart Card and hand held devices will explore an innovative way of achieving financial inclusion — not just in terms of access but in usage as well. It presents the prospect of coupling financial inclusion with NREGA.

The proposed pilot will facilitate financial inclusion over the channel and reach created by NREGA. In a districts where NREGA is operational and there exists a microfinance institution (MFI) like PSU banks, agricultural development banks, rural banks and non-bank financial institutions or an NGO, MFI/NGO can work as a Business Correspondent for the local bank. The government can team-up with the bank in ensuring that the weekly/fortnightly wages are directly credited to the savings accounts that have been created for the beneficiaries. Post offices (POs) as an existing infrastructure can also play the role of a Business Correspondent.

A variety of services (both financial and non-financial) can be provided to the beneficiaries once such a channel of linking financial inclusion with NREGA has been established.

IV. KEY STAKEHOLDER

The key stateholders in this are the Central Government, the State Governments, the Panchayats and the local community. The main implementation activities are at the Gram Panchayat and Block levels, while coordination activities are mainly at the Block and District levels. Planning, supervision and monitoring take place at all levels (Gram Panchayat, Block, District and State). At each level, the concerned authorities are accountable to the community. Since extensive monitoring plan is required; MoRD with

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the help of NIC (National Informatics Center) has developed software for data entry and MIS reporting for monitoring of implementation of this scheme. Banks or Post Offices providing financial services.

- ❖ Ministry of Rural Government
- ❖ State Government
- ❖ Panchayats
- ❖ Gram Rojgar Sahayaks (GRS)
- ❖ Wage seeker / Beneficiary
- ❖ Banks /Post Offices.
- ❖ UNDP

V. COST BENEFIT ANALYSIS**a. WHY SMART CARDS AND HAND HELD DEVICES?**

- To reduce human interface
- To overcome the literacy barrier at villages
- To make real time transactions and if
 - Records are likely to require updating over time
 - Records will interface with more than one automated system
 - Security and confidentiality of records is important

b. Barriers to acceptance of smart cards and hand held devices:

- Relatively higher cost of smart cards as compared to Job cards being used currently.
- Present lack of infrastructure to support the smart card, necessitating retrofitting of equipment such as vending machines, ATMs, and telephones.
- Lack of standards to ensure interoperability among varying smart card programs.
- Unresolved legal and policy issues related to privacy and confidentiality or consumer protection laws.

c. Advantages of smart cards and hand held devices:

Smart cards and hand held devices are a feasible solution for making data processing and transfer more transparent, efficient and secure.

- The difference in initial costs between the two cards, however, decreases significantly when the differences in expected life span and capabilities- particularly in terms of supporting multiple applications and thus affording cost sharing among application providers- are taken into account.
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- Per card cost decreases as higher volume of cards are ordered
- Secure independent data storage on one single card
- Durability and long expected life span (guaranteed by vendor for up to 10,000 read/writes before failure)
- The capacity provided by the on-board microprocessor and data capacity for highly secure, processing
- Adherence to international standards, ensuring multiple vendor sources and competitive prices
- Chip Operating Systems that support multiple applications
- Today, the major active application areas for microprocessor-based smart cards include information security, banking and credit cards, communications, government programs, physical access security, transportation, retail and loyalty, health care, and universal identification.
- Other Benefits include:
 - Real time and more authentic data collection
 - Reduced human interface
 - More reliable
 - Time saving
 - Increase in regional mobility
 - Convenience

Since like many other schemes of Government, complete benefit is not harnessed due to various weaknesses in implementation and monitoring, most sought application of Smart Card technology will be to ensure the proper distribution of wages among beneficiaries. By marking the attendance of individual household worker on Smart Card and diversifying the cash payment process based on attendance, to banks or post offices shall minimize the leakage of cash, and ensure the benefit to rural household. The Smart Card and hand held devices shall also provide the authentic data in terms of wages earned and payment made, without data connectivity link in rural areas.

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VI. COST AND FLOW OF FUNDS:

The cost of the project will depend upon the size and scale of the project. However, estimated cost of pilot project in one location for 2500 Rural Household is illustrated as follows:

Estimated Cost of Pilot for 2500 Rural Households				
SNO	ITEM	UNIT COST	NUMBER	TOTAL
1.	SMART CARD AND HARDWARE COST			
a)	Smart Card	60	2500	150000
b)	➤ Hand Held Device for transactions having: <ul style="list-style-type: none"> • Card Reader • Biometric or finger print device • Connectivity • Printer <i>For Muster Roll data collection from Job site.</i>	25000	2	50000
	➤ Hand Held Device with Mobile handset for connectivity	5000	2	10000
c)	Computer with Printer & UPS	50000	1	50000
2.	SOFTWARE COST			
a)	Software for State to use in other GPs also	500000	-	500000
3.	CONSUMERABLES AND MAINTAINANCE			
a)	Printer Cartridge, Connectivity charges, Stationary.	5000	-	5000
4.	TRAINING			
a)	Training including preparation of training material	5000	-	5000
5.	DOCUMENTATION			
a)	Project Documentation	5000	(10 copies)	5000
b)	Short Film	10000	(10 CDs)	10000
6.	TOTAL COST			
	Rupees Seven Lakhs Eighty Five Thousand			7,85,000

Note:

- (1) *The total cost for 3 States selected will be approximately 1 Crore*
Per state cost = 2.85 Lakhs X 10 GPs = 28.50 Lakhs Plus 5 Lakhs for Software.
= 33.50 Lakhs
- (2) *Cost of the project may vary depending upon the technology used, number of Rural Households covered and local conditions.*

VII. AREA OF PROJECT:

To begin with, a pilot initiative may be taken up in Andhra Pradesh, Kerala, Orissa, UP and Bihar to test the feasibility of the Smart card and hand held devices application under NREGA so that if feasible it may be implemented in other parts in a phased manner.

- **Number of GPs to be taken:** Each state should take up 10 Gram Panchayats (GPs) in 2 blocks i.e. 5 GPs in 2 Blocks.
- **Criteria of selecting GPs:**
 - The GPs should be such that it represents as much as possible the local conditions of the State so that when the project is implemented in whole State the model of the pilot can simply be replicated.

The above mentioned States have already taken initiatives in this area.

- ❖ **Orissa:** Have submitted the proposal and shared on telephone District Ganjam
- ❖ **Andhra Pradesh:** Have also submitted the proposal.
- ❖ **Kerala:** Wayanad and Palakkad districts of Kerala.
- ❖ **Uttar Pradesh:** Unnao district
- ❖ **Bihar:** Muzaffarpur

VIII. SCHEDULE OF ACTIVITIES:

- i) Identification of project location
- ii) Identification of rural households
- iii) Identification of trainees
- iv) Identification of Equipment
- v) Identification of Vendor
- vi) Procurement of Devices or other hardware
- vii) Software Development
- viii) Training
- ix) Distribution of Job Cards and hands on training to use Smart Card and hand held devices
- x) Project Implementation
 - a. Capture of attendance data through Smart Card and Hand held devices
 - b. Transmission of data by mobile phone to Central Server
 - c. Measurement of work on weekly basis
 - d. Transmission of work measurement data to Central Server through Mobile

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- e. Transmission of work measurement and wages to the Hand held devices through mobiles from Central server

- f. Data updation from hand held device to Smart Cards

- g. Use of Smart Card for withdrawal of wages from the hand held devices
- xi) Project Monitoring and Evaluation
- xii) Submission of Project Report

IX. PERT CHART:

Pert Chart is at the end of the document as [ANNEXURE-1](#)

X. CO-ORDINATION AMONG STAKEHOLDERS:

Co-ordination among each stakeholder will be done through regular review meetings. The representatives of the MORD may review the project on a monthly basis with the State Governments. The State government should take a review meeting on a bi-monthly basis with the implementing agencies and with the Banks or Post offices on a monthly basis to discuss the issues. The frequency of the meeting of the State government and implementing agencies will depend on the project requirement.

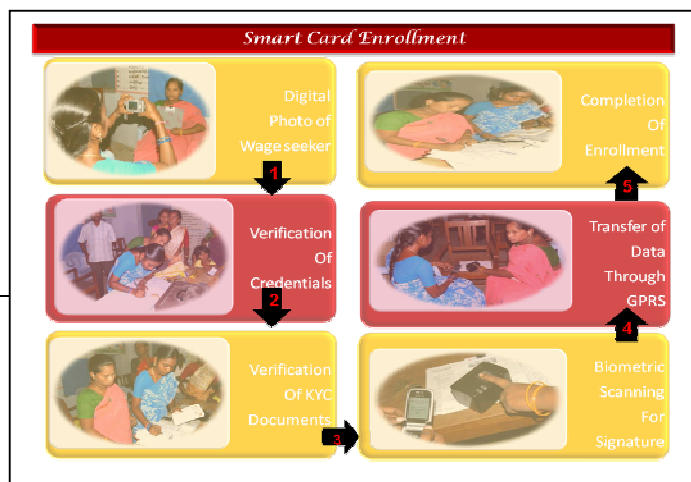
XI. SCOPE OF THE PROJECT:

The scope of the pilot project which will integrate all processes of NREGA into the Smart card and hand held devices along with wage disbursement using biometric smart cards will be as follows:

❖ Integration of following NREGA processes with the Smart Cards and hand held devices:

➤ Registration using smart cards and hand held devices

Those who are willing to participate in the program will send an application to the Gram Panchayat (GP) of their village. Verification of these households will confirm their local residence and number of adults in the household. Verification will be followed by registration and every household will be provided with a unique registration



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number and a biometric smart card which will act as a Job Card by the GP. Those who are already holding a Job Card will have to be provided with the biometric smart card for further use.

➤ Demand of work and issue of dated receipt

Demand of work, its recording and issue of dated receipt will be done through the use of smart cards and hand held devices in IT Kiosk or through mobile. By swiping at any IT kiosk, demand will happen at a place other than the executing agency. In addition to this it can be done at GP as it has been done till now.

➤ Recording of attendance at worksite

Attendance at the work site will be taken through the swipe of Smart cards or/and a device which can read biometric signatures. Device should be able to record latitude and longitude of the area. This will ensure presence of worker at the worksite.

➤ Muster Rolls and updation of MIS

All this data will automatically update the Muster rolls and so will be the consolidated household-wise employment data in the NREGA MIS. The number of days for which payment is made and unemployment allowance due will be recorded on the smart cards and hand held devices and updated into the MIS.

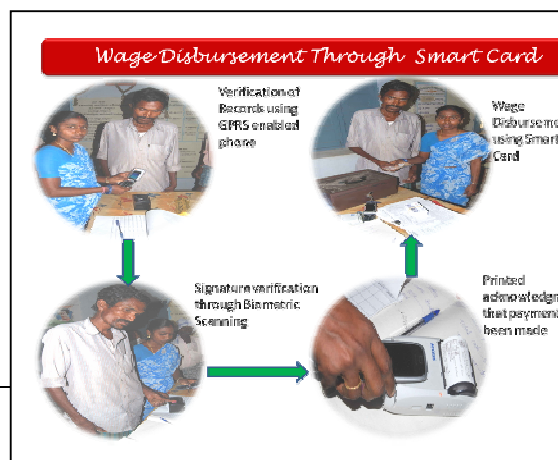
➤ Recording of output and wages payable

Muster roll data collected will be updated on the computer / intermediate server and finally to the NREGA central server on regular basis not more than a week after the measurement and calculation of the wages is done. The exact wages payable to the worker according to the actual work done will be updated on the Bank or Post office server as e-pay order.

❖ **Wage disbursement using biometric smart cards and hand held devices:**

Wage disbursement may be made available through 'branchless banking' by adopting the Business Correspondent Model and using biometric based technology for empowerment of rural population or through ATMs.

The services under the project shall be extended at special terminals (handheld machines) through Business Correspondents using Smart Cards. The smart card



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carries the photograph and other details of the card holder in a small chip embedded in the card and provides for authentication of the card holder through biometric fingerprint.

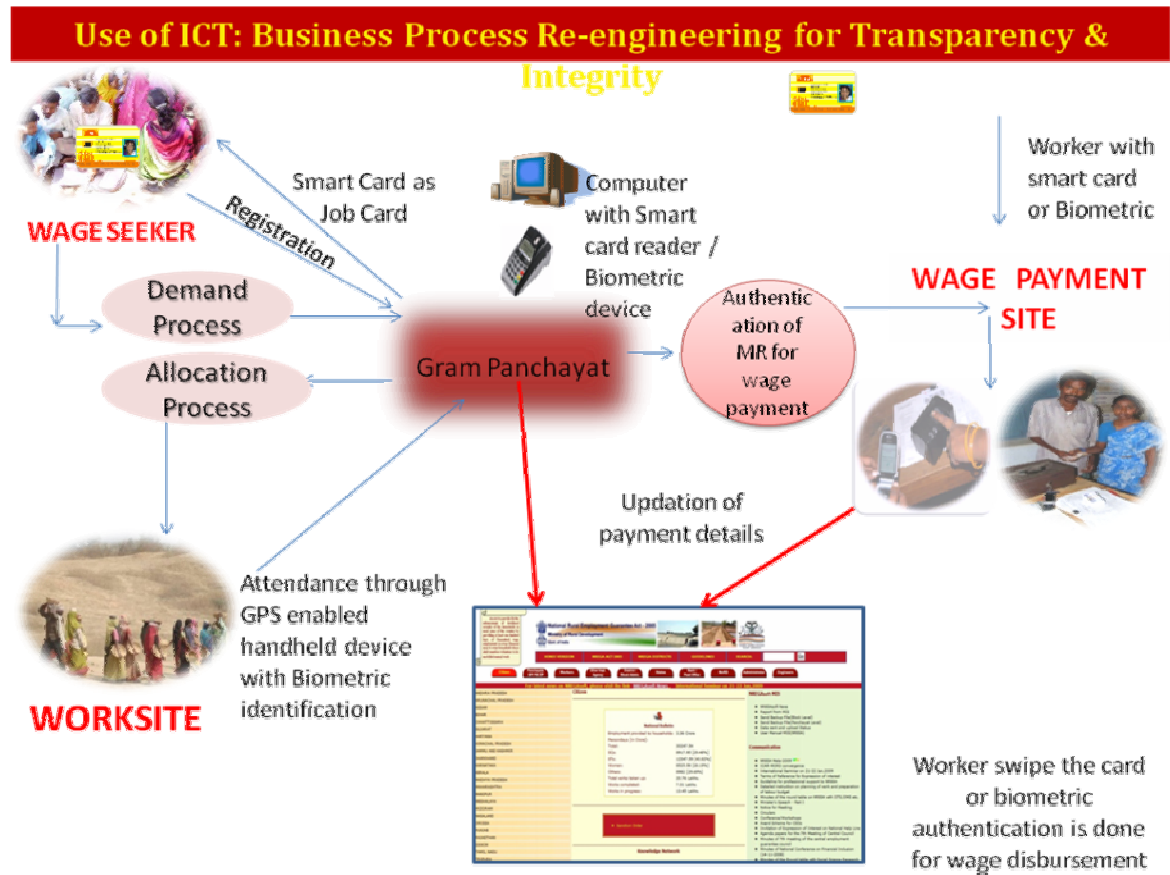
The channel of disbursement in this pilot project may involve number of players like the State Government, NGO/MFI, the agency/ agencies providing Smart cards and/or hardware/ software required for the project and the most importantly the individual beneficiary.

Information about beneficiary workers under NREGA will be sent by the GP Office. This information will be aggregated and uploaded through the NREGASoft software.

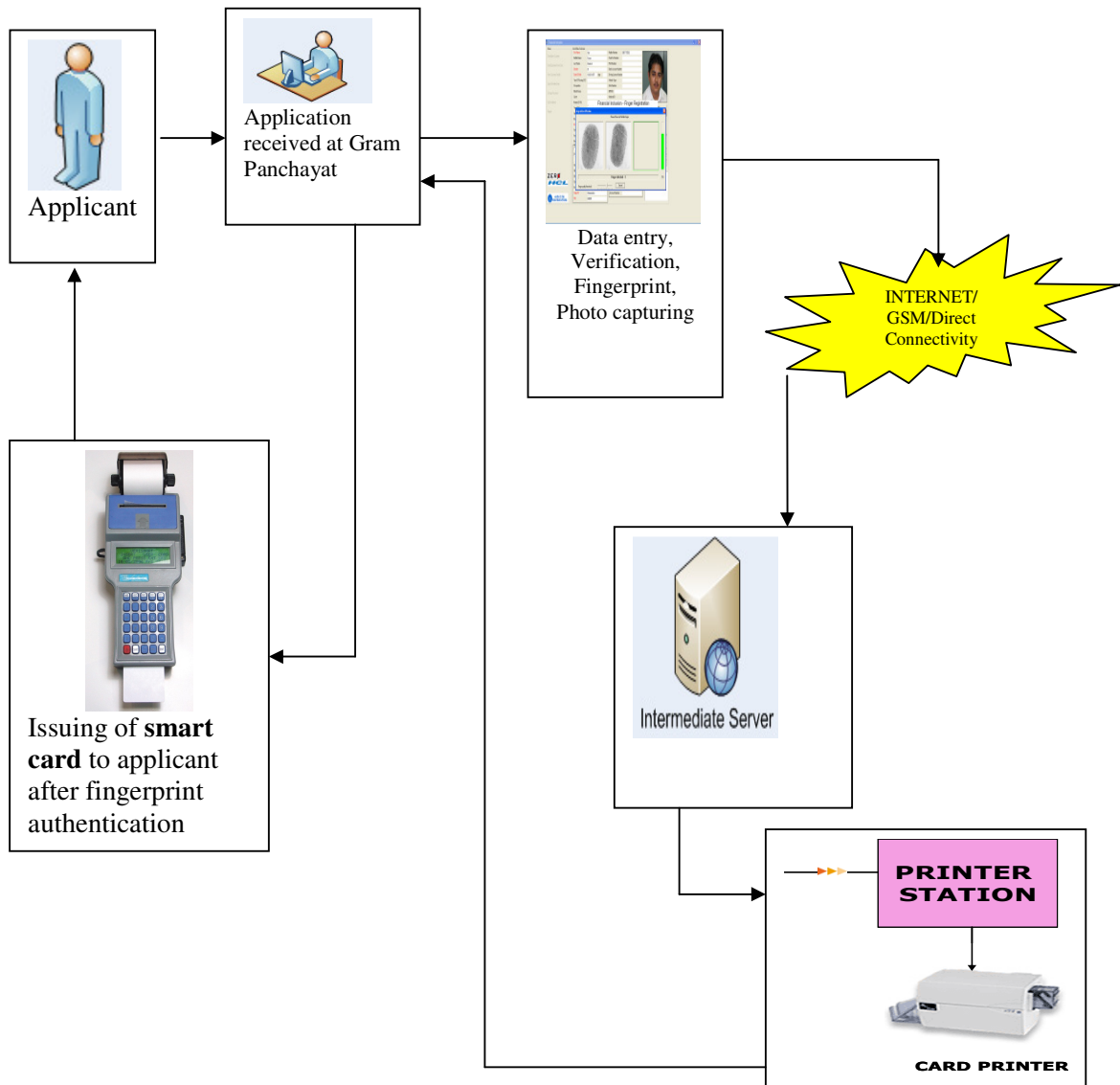
The GP office will then issue cheque worth the total disbursement for the week which will be deposited in the local bank or post office. Actual disbursements will take place when the individual beneficiary will swipe his smart card or give his biometric identification in a hand-held device which will verify his or her identity. The data will be automatically sent and synchronized with the NREGA server.

The technology involves a server where consolidated data from the GP is stored and the front-end devices such as the hand-held device and individual smart cards.

XII. PROPOSED ILLUSTRATIVE MODEL

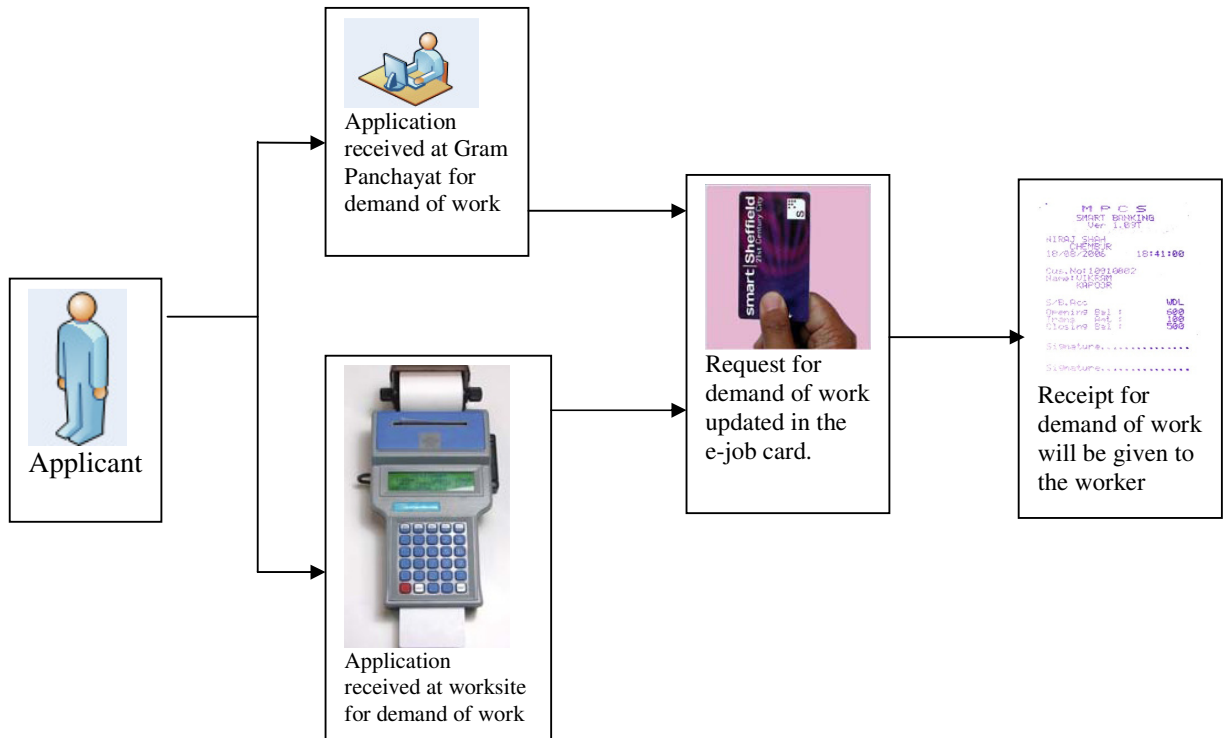


i. Registration Process:



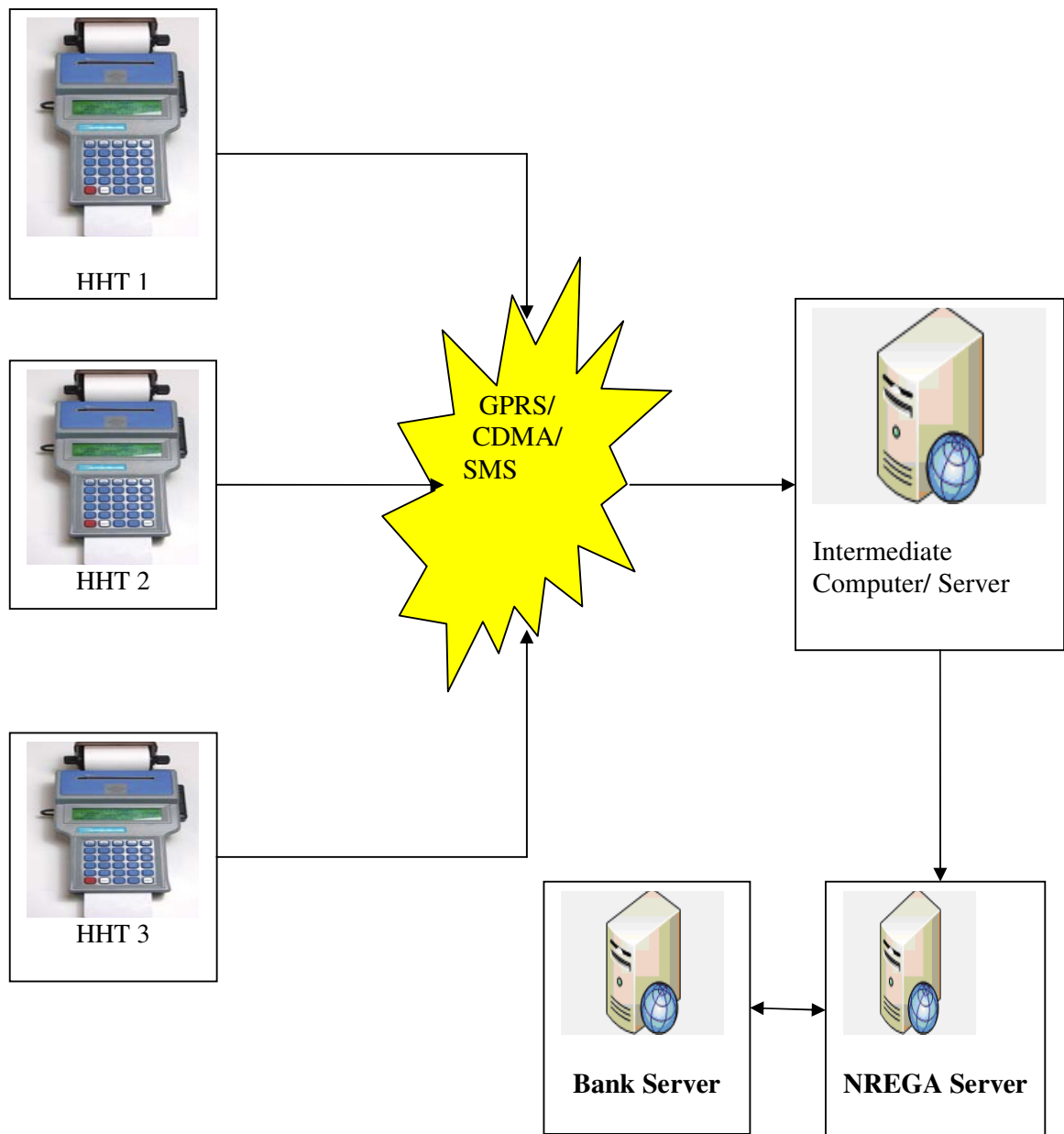
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ii. Demand for work:



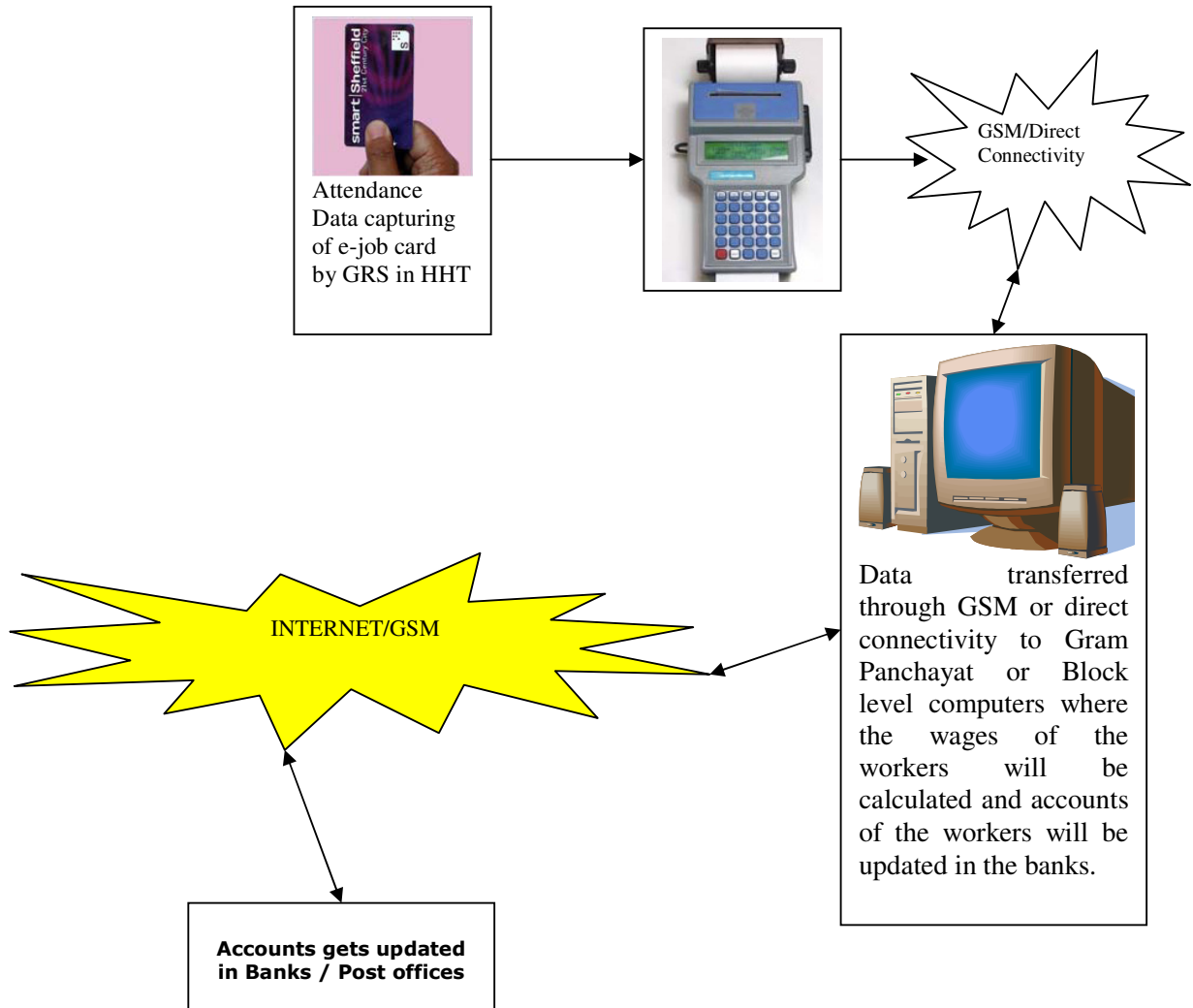
iii. Banking Transactions:

Architecture of Hand Held Terminal (HHT) showing banking transaction



iv. Attendance at worksite:

Architecture of Hand Held Terminal (HHT) showing transaction in and from muster rolls



XIII. TECHNICAL SPECIFICATION:

It is highly recommended to stick to standards wherever they materialize. Sticking to standards is the best way to design a standard system and be able to replace hardware or software modules that don't satisfy the needs. Sticking to the standards keeps independent of smart card or reader manufacturers. Hardware and software interfaces should be defined according to standards, whenever they exist.

The architecture should meet industry standards and best practices that minimize costs and risks to the project. Any alternate technologies should be based on open standards with equivalent/better security functionality..

The proven technology should only be used and be able to roll out at short notice. The system should be scalable and interoperable and work with different types of handheld devices and Contact / Contactless smart cards.

The technological details indicated suggestive are as follows:

A. SMART CARD SPECIFICATION

- ❖ Should conform to ISO 14443/ ISO 7816 standards for contactless/ Contact Smart cards and support read and write operations.
- ❖ Support Mifare Protocol
- ❖ The card should be of best quality PVC/polycarbonate material. Should be durable and should withstand flexing/ abrasion/ static electricity/ humidity/ magnetic field.
- ❖ Should be of standard dimension
- ❖ Key Length Supported (1024 to 2048)
- ❖ Symmetric Key Support (DES/ TripleDES Algorithm)
- ❖ EMV (Europay, MasterCard and Visa) compliant
- ❖ Should have a minimum of 32 K EEPROM (Electrically Erasable Programmable Read-Only Memory) memory, PKI enabled. By international standards, this memory should retain data for up to 10 years without electrical

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power and should support at least 10,000 read-write actions during the life of the card.

- ❖ Should conform to Global Platform Specifications [V 2.0.1]
- ❖ Provision for Unique number for card serial number.
- ❖ Should guarantee Card worklife of at least 5 years.
- ❖ The card should allow the reader to compare the fingerprint template stored on the card and the live finger print of the card holder read by the fingerprint reader.
- ❖ Should specify the breakup of the space allocated in the smart card for various requirements like User Certificates, Smart Card Operating system, Applications provided by the smart card vendor, Customized application and future applications.

B. HANDHELD DEVICES:

I. General Requirement

- ❖ The device may be a single integrated system or could be in maximum of 2/3 components.
- ❖ All required devices should be freely (easily) available to carry out the activity on a large scale.

II. Handheld Device Specifications

- ❖ Should conform to ISO 14443/ ISO7816 and ISO 18092 standards for read and write operations.
 - ❖ Should have built-in PKI support
 - ❖ EMV compliant.
 - ❖ Multilingual support.
 - ❖ Should have online connectivity possible, and also have ability to transfer data using offline methods.
 - ❖ All communications with the handheld devices should be by secured modes.
 - ❖ Should be battery operated with several days in standby, and at least 8 hours of continuous operations.
 - ❖ Fingerprint system should be able to match the live fingerprint against templates stored on the customer card.
 - ❖ Application should be upgradeable in the field.
 - ❖ Agent based rule definition.
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- ❖ Should have capability to store required amount of data
- ❖ Should have ample available memory for application

III. Capability of hand held device

The device should be capable of undertaking the following functions:-

- ❖ Reading fingerprint of customer;
- ❖ Comparison of the above fingerprint with fingerprint template stored on the smart card
- ❖ Validation of cards with respect to authorized hand held device
- ❖ Authentication of the customer
- ❖ Secure storage of transactions
- ❖ Facility for online connectivity
- ❖ Uploading and/or downloading of transactions to/from Intermediate system through online connectivity as well as through offline modes
- ❖ Secure communication between handheld device and all other devices/systems
- ❖ In case of any communication failure, it will ensure that no data is lost during transmission
- ❖ Printing reports/ mini-statements, receipts with a printer
- ❖ Maintenance of full traceability and audit trail of the transactions
- ❖ Locking the device from further usage whenever the business agent failed to upload the day's transactions to the intermediate server even at the End Of Day or reached the permissible limit of transactions
- ❖ The handheld device should be able to maintain a database of linked customer accounts, and to transfer/upload the transactions either through online connectivity or offline modes. These downloaded transactions from the backend should be written subsequently in the respective smart cards during the next visit of the card holder.
- ❖ Device may also have Voice Interactive facility (Regional Languages are also to be enabled)

C. FINGERPRINT SCANNER

The Fingerprint Scanner to be deployed needs to have following minimum technical specifications –

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- ❖ Minimum requirement for image acquisition should be the Setting Level 31, as defined in the ISO/IEC 19794-4 and Scanner device needs to generate clear distortion free images using the advanced optical methods. Protection from strong ambience lights should be provisioned for this.
 - Contact Area - 1x1 square inch.
 - Minimum Capture Size – 13 mm wide x 17 mm high
 - Pixel density of 500 ppi with ± 5 ppi.
 - Pixel Depth – 8 bits
- ❖ Dynamic Range of Scanned image – minimum 200 grey levels prior to comparison.
- ❖ Grayscale finger image data should be stored, recorded and transmitted in uncompressed – bit packed form.
- ❖ Scanner Surface should be dust and humidity resistant, in the form that the dust and humidity levels should not be damaging the scanner surface.
- ❖ Scanner device should be capable of sensing the Live-scan plain Finger impression. This would require the Scanner Device to have strong anti-spoofing features, whereby only live fingerprints will produce an image & also protect from use of residual images
- ❖ Scanner device should use precise and fast processing algorithm to ensure efficiency and reliability.
- ❖ Scanner device and algorithm used for developing minutiae shall be configured to address security requirements of the bank and protected from unauthorised changes
- ❖ Scanner device must encrypt the finger minutiae with 3DES or equivalent strong encryption algorithm before transmitting it over the network for authentication.
- ❖ Scanner Device should be ready to use with ease of integration and interoperability
- ❖ The Scanner Device must confirm to ANSI-378 standard to meet the Data Interchange requirements set by the standard.
- ❖ Scanner device must be resistance to impact and shocks.
- ❖ Scanner Device must be immune to Electronic Discharge.
- ❖ Scanner device should be protected from strong ambience light, temperature variations, humidity and similar environmental variables.

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- ❖ Scanner device should have temper resistant design, to avoid alterations to the physical device and/or connectivity modes with the various components to prevent relay or bypass attacks.
- ❖ Scanner device must have broader range of applicability, especially for use in extreme conditions and climates.
- ❖ Scanner device must be capable of generating audit logs and customizable reports of security events that should be reported to the central repository. Adequate security measures are desired to protect this data.

Image Acquisition Requirements

- ❖ Scanner device should be capable of capturing and transmitting either minutiae or raw image as required.
- ❖ Number of Fingers of which images needs to be taken should at least be two fingers.
- ❖ Each record shall pertain to a single subject and shall contain an image record (consisting of single view) for each of one or more fingers; multiple fingers (single image records).

D. INTERMEDIATE SYSTEM (In Case If Required)

The Intermediate software will have the capability of switching and connecting the front-end devices with the backend in a secure manner. It will also have following additional functionalities.

- ❖ Only Authorized or registered devices can connect to the Intermediate System
- ❖ Intermediate System will push software upgrades, if any, to the handheld device during every BOD (Bandwidth on demand) and ensure that all the handheld devices are having the latest version of the software
- ❖ Ensure that all the upload done from the various handheld devices/Laptops is properly accounted in the system with various status flags.
- ❖ Ensure that all the download done reach the appropriate handheld device and the update is done in the corresponding smart card.
- ❖ Secure communication between all devices/systems end-to-end.

E. CARD PERSONALIZATION:

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This software will include following functionalities:

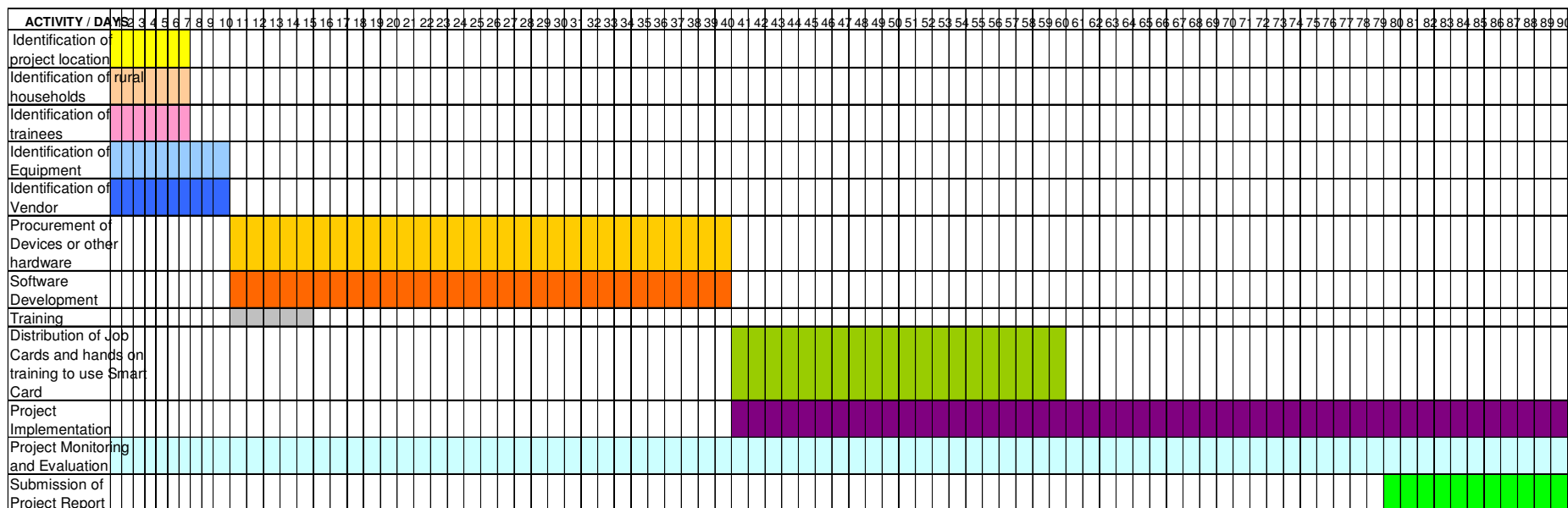
- ❖ Although currently one card would be issued per account, there should be provision for linking multiple cards to single account, multiple accounts to single card and multiple accounts to multiple cards.
- ❖ Photographs, Documents of proof of identity / residential address, entitlement to receive remittances under various schemes, application form, raw finger print images etc that are scanned at the time of registration or thereafter have to be securely stored. The physical copies of documents etc that have been collected from the beneficiaries should so be securely stored.
- ❖ Card personalization infrastructure should be located within the premises of the Gram Panchayat (GP). In case GP chooses to allow the IT Kiosk to run these operations at IT Kiosk's premises; in such an event GP would be given access to conduct audit of the systems and processes.

Overall the Smart Cards and the devices described above should not be any software, Hardware dependent and allow interoperability with other standard devices and readers.

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XIV. ANNEXURE-1(PERT Chart)

PERT CHART



XV. ANNEXURE-2 (Activities and Deliverables)**➤ AS IS STUDY followed by submission of report at the end of following activities**

- xiii) Identification of project location
- xiv) Identification of rural households
- xv) Identification of trainees
- xvi) Identification of Equipment
- xvii) Identification of Vendor
- xviii) Procurement of Devices or other hardware

➤ Software Development:

- Software development followed by software audit report

➤ Training

- Training to the GP Staff including GRS and Secretary
- Distribution of Job Cards and hands on training to use Smart Card and hand held devices
- Submission of training report

➤ Project Implementation

- a. Capture of attendance data through Smart Card and Hand held devices
- b. Transmission of data by mobile phone to Central Server
- c. Measurement of work on weekly basis
- d. Transmission of work measurement data to Central Server through Mobile
- e. Transmission of work measurement and wages to the Hand held devices through mobiles from Central server
- f. Data updation from hand held device to Smart Cards
- g. Use of Smart Card for withdrawal of wages from the hand held devices

➤ Project Monitoring and Evaluation

- Monitoring at the State level to be done by the Co-ordination committee at State level.
- Daily monitoring and evaluation of the project
- Submission of Monthly progress reports.
- Report after cost and benefit analysis of the pilot project along with recommendations.