PAPERLESS BANK ACCOUNT CREATION

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ABSTRACT
The existing system of opening a bank account is a tedious multilevel process which requires human interactions at each level and is time consuming. With time, this may lead to human errors and may result in lower productivity. In an effort to save time, we can digitize the complete process of bank account creation using latest biometric technologies.

Fingerprint and Iris recognition are some of the most prominent biometric methods which are used in the present day world for data collection. A customer would have given their fingerprint or Iris scan data while generating a Social Security Number (SSN) whose data would be stored and maintained at a unified location. When a customer approaches a bank to open an account, the bank will have to only scan the customer's Iris or take the fingerprint and send the details to centralized database to get the necessary information about that customer. The data received from the unified database would be locally stored and then displayed to the customer. Upon validation check, only relevant details of the customer will be populated on the online account creation page. The bank will retrieve data from a third party vendor and may outsource the data management to an external businessperson, but holds the authorization on data security.

Since, we are only re-populating an already authorized and validated data again on a different webpage, there is no need to cross verify customer documents again. In this way we can eliminate human errors during data entry, save time at both ends, reduce cost and resource count. In future, if a customer wants to open a different account type, only the type of account must be updated with the bank, which avoids repetitive documentation check.

Keywords
Paperless, Iris Recognition, Social Security Number, Fingerprint, Biometrics, Database, E-banking, ATM, Localization, Normalization, Automated Clearing House, Payment transactions, Asset lending, Operating Systems, Drivers, CASIA, MMU, UPOL, UBIRIS, BATH, Near Field Communication.

1. INTRODUCTION
Information technology is the fastest growing domain of all the fields in the business market. Technology is so much advanced that we have self-driven cars, analyze and consume information in the most innovative ways, restaurants know our orders before we walk in the doors, authenticate transactions through various mechanisms. Of all these expanses, banking industry has a remarkable ability to impact the business growth which plays a crucial role for both the customers and the organization and eventually the country's economic growth. There is a continuous shift in new emerging technologies eliminating the longstanding old ones. Today capital stock is undergoing an increasing pace of renewal through investment of tax flows from older technology, capital equipment, and facilities into innovative and more efficient business practices. Capital reallocation across the economy has been made possible by development of innovative financial products, many of which themselves owe viability to advances in technology. that overcomes significant unbundling of risks in capital markets. It is necessary to carry sizeable backup of stock and materials, preserve additional resources on payrolls for making up in case of any inevitable miscalculations and unforeseen shifts in demand for their products and services. At the micro economic level, essential contribution of information technology is the expansion of knowledge and reduction of uncertainty. Availability of real-time information has made it possible for businesses to prevent investing from superfluous inventory, hand out of labor and investment redundancies. Reshaping the global banking sector is a major objective we need to focus on. (Lesego M. Chauke, 2008).

2. ITIL SERVICE MANAGEMENT
2.1 Service Strategy

Image 1: Banking buzzwords (Bank Marketing Strategy, n.d.)

Industries must be more customer focused that may be accessible anytime, anywhere with simplified business and operating models, creating innovation retail bank offerings, actively using data to improve customer service and proactively managing risks, regulations, and capital. The vicissitudes that came in from the mobile service offerings, focusing on strategic response banks would need to take, to be a leader in the evolving landscape of technological market place. There are specific priorities that must be concentrated on for a retail bank to become a leader in the

business market. Per PwC (PricewaterhouseCoopers), a global professional accounting services firm, a survey on "Retail banking 2020 Evolution or Revolution", there are certain fundamentals that empower in reforming the retail banking industry. (Retail Banking 2020 - Evolution or Revolution?, n.d.)

- Developing customer-centric business models
- Optimizing distribution
- Simplifying operating models
- Creating an information advantage
- Enabling innovation and taking a proactive approach to risk, regulation, and capital.

Staying the same is not an option. There must be upgradation in par with the technology. One of the major upgrades thinkable in the banking industry is the paperless, signature less bank account opening. The rational way would be that, the banks would have endless queues throughout the day for every transaction, filling the forms for each process, loads of papers leading to a whole trail of paperwork.

To overcome these hurdles, paperless account creation follows techniques that

- Save customer's and bank employees time by using biometrics.
- Reduce data redundancy and data management.
- Complete elimination of human data validation.

The current market follows the manual account creation process. Decisions must be taken of what drives the existing business and customers benefit of using the services provided such that the competitors are out beaten. There is no scope for banks to have a catastrophic failure in the strategies they incorporate that impacts the retail market and the customers. Create strategic proposals by allocating biometric techniques based on specific customers and to develop strategic assets by focusing creating business value for the services provided, designing physical devices which captures and monitors the entire input process thereby reducing time, thus accomplish business requirements.

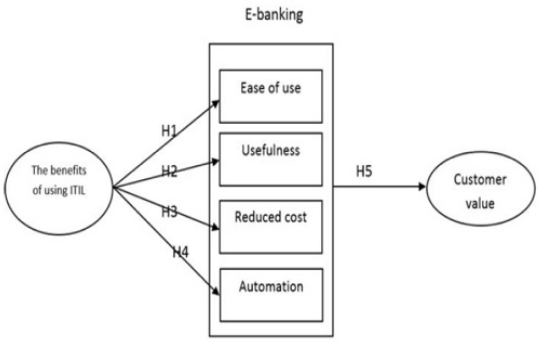

Image 2: Conceptual framework of E-banking (Fasihi, 2015)

The framework explains the relationships between the benefits of using ITIL strategies on E-banking. Maintaining customer relations is the most important aspect that brings value to the service in the business that having more demand in the market. Any service being offered must be convenient to use, with an economical advantage for the customer and to automate the entire process thereby bringing down manual efforts and queuing procedures. (Ngo Vu Minh, 2016)

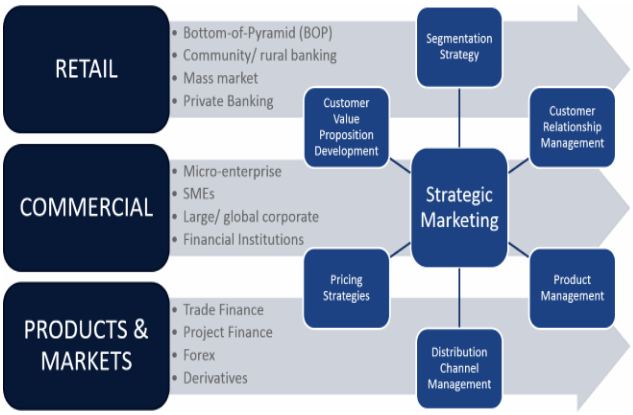

Image 3: Segmentation Strategy for banks (GBRW Learning, n.d.)

Strategies must be such that the input process is highly efficient and accurate as it deals with the most secure data.

Following are the set of activities that the banks need to strategize to grow as a successful asset in the commercial market place.

- Ideas must be widely focused such that it covers all facets such as retail dealing with the type of banking offered, commercial area being targeted may be a small enterprise, global corporates or financial institutions, products, and markets.
- Support services must be equally defined such as providing internet facilities for accessing the emails and downloading the mobile applications.
- Customer service is very vital, constancy in delivering services and building trust, building a valued by relationship on a long-term basis.
- Flexibility in providing services around the clock for customer issues, small gestures when the customer is at the bank for a specific reason matters, being kind to them make add lot of value on customer relationship.

Service strategy comprises a set of processes that individually target specific areas of excellence in developing a plan to design a model that realizes the business goals appropriately.

The Service portfolio management prioritizes and manages investments how to meet business requirements with right mix of services at economical investment. Defining, approving the new or changed services. Do we need to make changes to our existing services to implement new change? If yes, its pros, cons, risks. Allocation of financial resources, profitability, invoicing budgeting, accounting, and charging are other aspects to be focused on. Patterns of business activity describes the demand for services. Internal service provider must collect the existing customer data from internal teams or take backup of all the records before migrating to new set of activities. The external service provider includes outside vendors for data management and access provision. Having the above-mentioned strategies in hand the design process is implemented as described in the next section.

2.2 Service Design

With the strategies for paperless bank account creation in place, the process of designing and implementing the biometric Iris scanner services takes place in accordance with the policies and business requirements of the respective banks. The main objective of service design is to develop new solutions for the services. These developed services are then passed on to service transition for testing. The Service Level Management helps the bank customers with the usages, benefits, risks associated with the biometric Iris scanner services. It makes sure that the existing biometric services included in the bank are supporting the new Iris scanner service which is to be used for opening of new bank accounts for customers. It also monitors the customer's satisfaction levels who have used the services from biometric Iris scanners. It mainly includes the biometric service activations for new customers of the bank on the basis of their specific service requirements. It also includes the maintenance of the customer portfolios and also provides predefined samples of biometric data for various service level files and for purposes of testing. Periodic reporting and monitoring of bank customer's data is performed to assess the biometric Iris scanner services with other existing services incorporated in the bank. To meet the above demands of the Iris scanner service application in an Information Technology environment, capacity management should be incorporated. Since Iris scanner service links with the departments dealing with resource planning for customers and clients, it is important to have capacity management to deal with the heavy bandwidth for users opening new bank accounts, remote storage and back up of user's data. The capacity management understands the service delivery modules and operational delivery modules associated with the Iris scanner services and ensures that all the technological and human resources are in place for efficient utilization of newly incorporated services. It involves the following activities –

- Business Capacity Management

  This process ensures that all resources perform as expected when new business requirements or goals such as extending Iris scanner services for replacement of ATM PINs are implemented based on trend and forecast models. This process help the banks to extend business plan and identify thresholds for resources for Iris scanner service to new developments.

- Service Capacity Management

  This process involves monitoring and analysing of Iris scanner operations and capturing all the logged data, time delays, planned and unplanned outages, failures, incidents, downtime and processing times for new account creation using the biometric Iris scanner service. Special software resources are incorporated to compare the actual outcomes and responses with desired targets as mentioned in the Service Level Agreements.

- Component Capacity Management

  This process deals with the Information Technology infrastructure like storage, database systems, software applications to keep the Iris scanner service running.

To maintain the vital information for the service management processes, it is important to maintain a database about all the live services offered by the Iris scanner and their working technologies. The working technology of Iris scanner involves image acquisition of the customer which is then followed by localization and normalization of the acquired image. The matching of the features of the customer's image is done by feature extraction method which involves principal component analysis. The textual patterns generated are then matched with the database using artificial neural networks and the match results are then displayed accordingly (Aparna G. Gale, 2016).

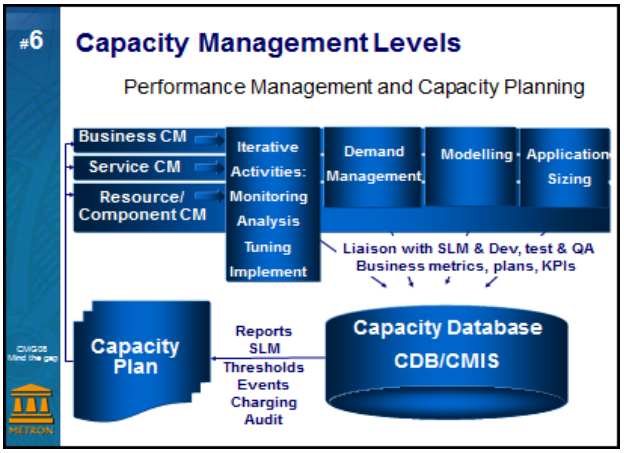

Image 4: Capacity Management (Grummitt, 2014)

To get the matched results and keep the Iris scanner service running at optimal efficiency, it is important to ensure that technological and human resources are available always. This is taken care by employing advance measures to provide process and people support during the times of high customer turnout at the banks to open new bank accounts. This is achieved by optimizing the capability of Information Technology infrastructure and determining the Vital Business Functions.

The Vital Business Functions for Iris Scanner service are –

- Retrieving data from centralized server to autofill the customer details once the patterns from Iris scan match.
- Storing a copy of the data authorized by the customer at bank's local storage for the reference of the bank.
- Secured authorization and transaction of the customer's data.
- Ability to link customer's data from one service to other service which the banks offer.

Vital Business Functions are more critical than other functions. Hence, it is important to set aside additional technological and human resources to cater to their needs. These needs can be fulfilled only when the resources are available always and have continuous disposal.

This is achieved by having risk reduction and recovery options. It also ensures that the services related to Iris Scanner such as service desk team, communications team, technical support team and systems network team are available always to assist in the opening of new bank accounts. For biometric based services, it is essential to carry out the risk analysis technique to identify components, analyze threats and vulnerabilities to the biometric systems. The threats and vulnerabilities for biometric Iris scanner service can be Distributed Denial of service attacks on bank's servers, theft of bank user's confidential data.

With biometrics used as security feature, it does not leave any physical trace of passwords or patterns being entered which may

be used later on for purposes of stealing. It will implement two factor authentications to act as a secondary verification factor for the Iris scan. It will be coupled with the keystroke dynamics wherein if the Iris scanner does not recognize the Iris scan image of the customer, it will consider the time taken to press each key along with the amount of time between keystrokes (ID Control, 2014) on keypad for fraud detection and additional safety. Iris scanner collects and measures both physiological and dynamic data of customers which rarely change over time

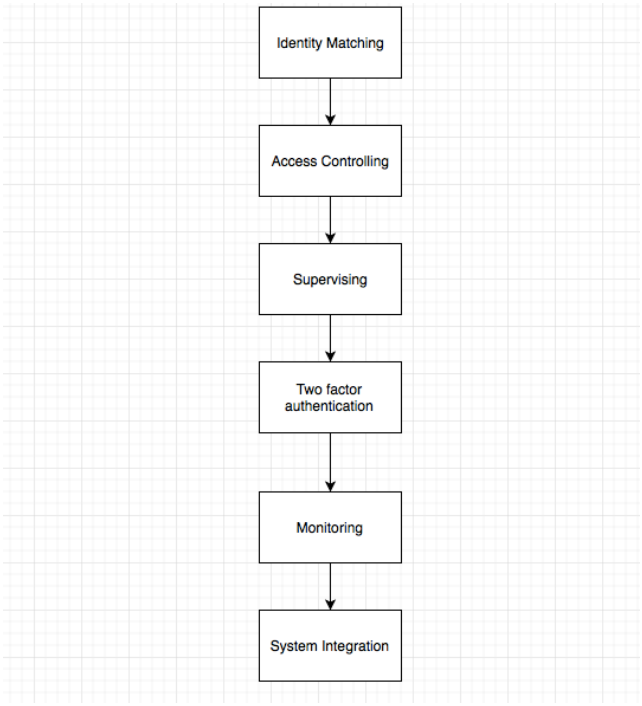

Image 5: Biometrics work flow

To efficiently organize all of the above activities, the banks should have third party suppliers to provide the Iris scanner devices, technical support and other associated services at affordable costs. The service providers are based on their offerings of different resolutions, image qualities, colors and greyscale of Iris scan patterns. (Aparna G. Gale, 2016). The critical component delivery systems such as Iris scanner database containing user account details can be retained by the bank themselves and act as internal suppliers to form a separate team within the bank for it. In case of using external suppliers, a formal contract is required to be established between the bank and the supplier which describes the service level and operational level agreements. A supplier and contract database should be created to enable efficiency while implementing the policies to the customer community base. The supplier and contract database consists of configuration management system and service knowledge system which outline the requirements and deliveries in detail for the Iris scanner services.

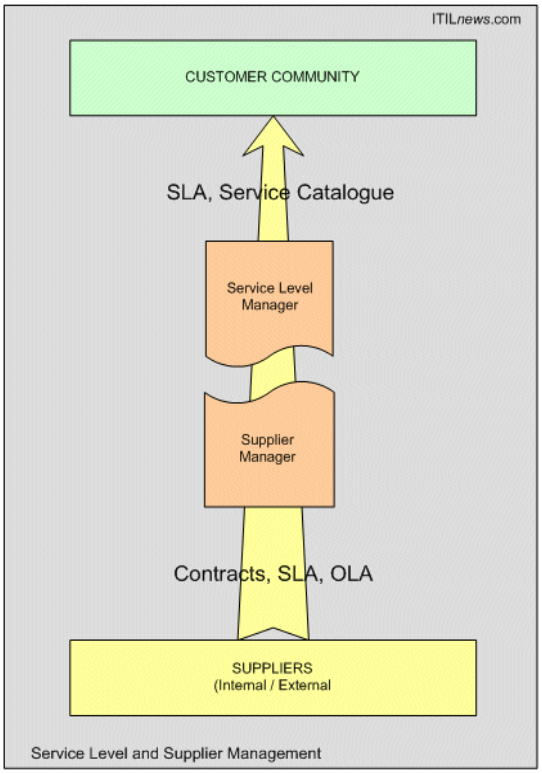

Image 6: Service Level and Supplier Management (ITIL News, 2016)

With the supplier providing the required resources, the service transition outlines the actual implementation of the Iris scanner service into the existing bank system.

2.3 Service Transition

Once the new process design of the paperless bank account opening mechanism is finalized in the Service Design state, it will be passed on to Service Transition juncture for further processing. Service Transition is the third module under ITIL practice. The foremost intention of this division is to construct and utilize the IT services by ensuring that the changes for services and service management processes are conveyed in a harmonized way. This block will seamlessly convert the recent and alternated services into operations. Administering the uncertainty for recent, changed and venerable services safeguards the product surroundings. This cooperation will bring profit to the services and customers. The aspiration of the service transition is to take care of capacity management, creating and maintaining forthrightness between service assets and configurations, handling release and deployment management, supervision of test and production environments, and finally to check whether the services are coordinated with the given requirements. Then the ambition of this module is to map customer likelihood to performance of the services, fuse the business processes with stakeholders and minimize known anomalies and risk. The purview of this block consists of governing the processes, systems, and functions, build, test and deploy a release into live environment. (ITIL_ST_BOOK). Below mentioned are the main processes under service transition domain:

- Change Management
- Change Evaluation
- Transition Planning and Support
- Application Development
- Release and Deployment Management
- Service Management and Testing
- Service Asset and Configuration Management
- Knowledge Management

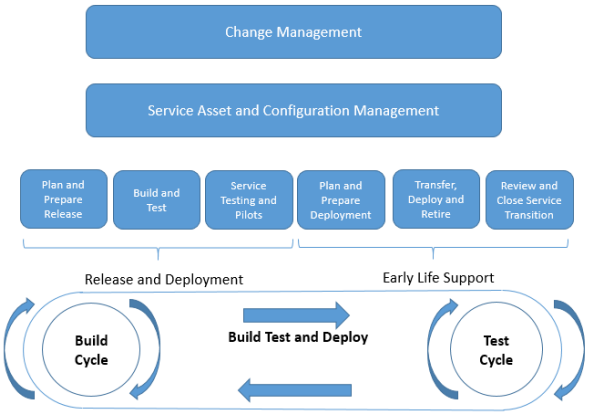

Image 7: Service Transition Life Cycle

Since there is a transformation in account opening process, the modification must be fractionally distilled through Change Management Process. When actualizing the biometrics system, especially in the finance domain like banking, there are number of circumstances that need to be contemplated and contrasting categories of biometric systems are more pertinent for assertive ambience and practical propositions. The main perseverance of these systems is performance, and this is dependent on the quickness and faultlessness of the realization which can be afflicted by the surrounding encompassment where the structure or the system make progress. The change management board should also inquire about other extreme conditions like how effortlessly the system can be deluded by adopting sophisticated deceitful methods and the influence of the system by the dossier materials. Iris recognition systems are comparatively uncomplicated to use granting immense number of people to be handled swiftly but complication can materialize with reflection from glasses or the cameras.

At an individual level, biometric systems can pose significant challenges, certain group of people with below average eye sight may have difficulty in using iris recognition systems and on the other hand these biometric systems might not be able to recognize individuals with glaucoma, cataract, and visual impairment (Leicester, 2010). With the above feasibility study of the new change, the change management system must also perform an impact analysis with other regular functioning departments like, payment transactions, asset based lending, ATM card requisition, Automated Clearing House (ACH) operations, Product Servicing, Campaign Management and so on. Change evaluation should be thoroughly done before implementing the new changes into the existing process to avoid any disruptions in the organization. Below is the diagrammatic representation of Change Management Life Cycle.

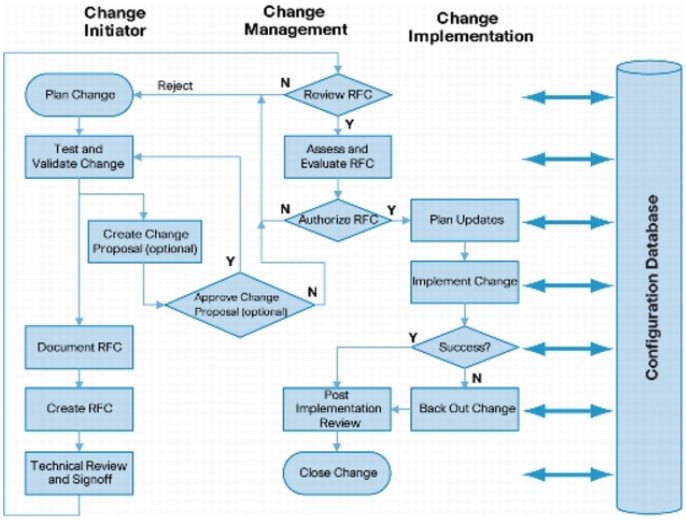

Image 8: Change Management Cycle (CISCO_CM, 2008)

Below are the common steps involved in developing biometric drivers, which are the main component of every biometric devices. (MSDN, 2016)

- Learn about the operating system and its drivers.
- Learn how the operating system supports biometric drivers.
- Review the biometric driver samples in specific development kit.
- Select the driver model for the biometric driver.
- Learn about the OS driver, build, test and debug processes and tools.
- Finalize the design decisions about the biometric driver.
- Develop, build, test and debug the newly developed biometric driver.
- Create a driver package.
- Sign and distribute the biometric driver.

When the development is complete, the biometric drivers and the corresponding system must be tested for various functionalities. To ensures quality assurance of the implemented services at the customer's location by providing value to the organization. The intention of testing is to check new processes or changes that are placed at client's location, ensure quality of the services, and detect the issues, examine, and address them in a stipulated time zone. The main ambition of the testing and service validation module is to validate whether a service is 'Fit for Purpose' or not by simultaneously monitoring the performance of the implemented services. When the deployed services are not thoroughly tested, then following issues will arise from production environment: (ITIL_ST_BOOK)

- Incidents and Support Desk Calls for resolution
- Problems and errors that are difficult to recognize in production environment
- Cost will be sky rocketed if they are found in live environment.
- Ineffective use of services.

Before testing the Iris Recognition biometric system, one should first understand the workflow of Iris Recognition System. Below is the block diagram which displays how Iris Recognition is done through feature extraction with principal component analysis and artificial neural network computational model. (Gale & Salankar, 2016)

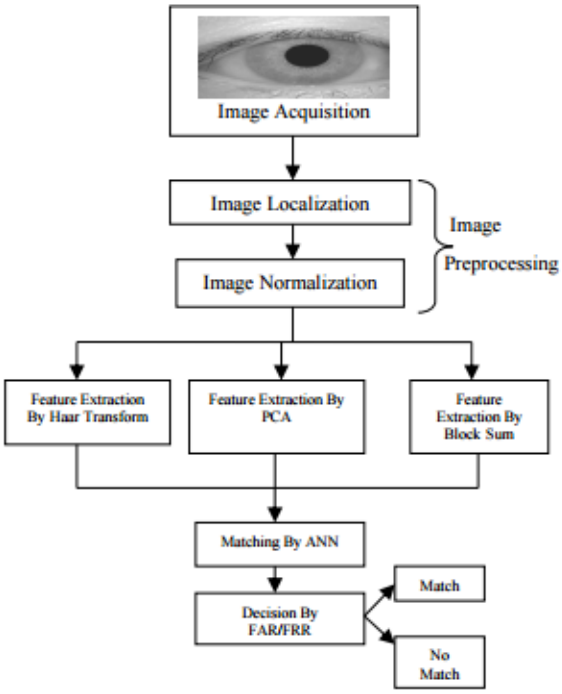

Image 9: Iris Recognition System.

There are several criteria of biometric systems that must be thoroughly acknowledged through testing activities. Below are the few dominant ones that must be taken care of in the testing phase: (Ruggles, 2001)

- Repeatability
- Acceptance
- Discrimination
- Practicality
- Throughput
- Response Time
- Accuracy

To test the Iris Recognition biometric system for its complete functionality, one can use the details of publicly available databases with contribution from various authors. There are many Iris databases available for research and educational purposes which will aid to verify the performance of Iris recognition systems thus encouraging the advances in this field. Several Iris image databases such as CASIA (the most widely used public datasets), MMU, Bath, UPOL, and UBIRIS are freely available for experimental purpose. Recently CASIA-IrisV4 is released on Biometrics ideal test. The first version has the advantage where the images are photographically edited to make the region of pupil to be of uniform intensity. BATH: images from this database are similar to that of MMU having similar characteristics and few noise factors with small eyelid and eyelash obstructions. UBIRIS is the database of noisy images constructed by University of Beira Interior taken from 241 subjects during acquisition. (Patil, Gudasalamani, & Iyer, 2016). Below is the image showing the Iris images obtained from different datasets. (El-Naggar & Ross, 2015)

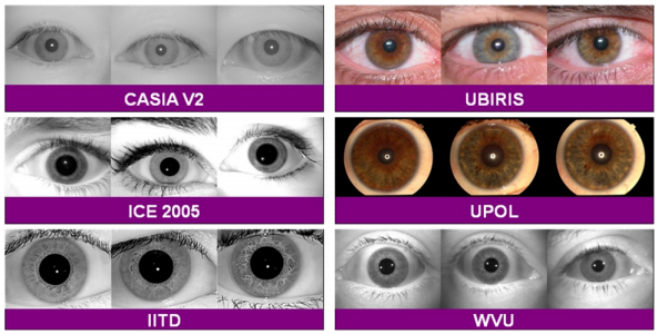

Image 10: Examples of Iris images from different data sets.

Performance assessment of biometric identification technology are differentiated into three categories by considering the accumulating complexity of the unbounded variables.

- Technology
- Scenario
- Operational

The main goal of the technology evaluation is to measure the performance of the biometric systems, generally focused on the recognition algorithm component. This process is repeatable and takes very less time to complete a cycle. Technology Evaluation are usually done by taking common datasets gathered from previous observations. The output from this testing method highlight specific areas which would require future research and development. In scenario section, the performance of the biometric system working on a specific application will be tested and monitored. This evaluation will take few weeks to conduct multiple trials. Results from Scenario Evaluation depict the areas that require supplementary system integration and contribute performance data on systems for the test bed. Operational evaluation looks comparable to scenario evaluation at a higher level, but Operational evaluation is done at the actual site. This test method normally aims to determine the roadmap impact induced by extension of a biometric system. Generally, Operation Evaluations are not repeatable. This will last for several weeks to months. This is the ideal three stage evaluation process of biometric systems. Once the thorough testing is done the devices and systems will be moved to Operation, that is production environment. (NSTC, 2006).

2.4 Future Enhancements

By 2017, it is expected that every customer would be using mobile banking. This would be possible by customizing banks as per what the customer demands and its capability to deliver services with the current technology in hand. There is always scope for new-fangled innovations every single day to embrace a stiff competition in the technology market and to realize the potential of tomorrow.

Few of such novelties are:

- Talk Transfer, a voice authenticated fund transfer service, that allows to assist the mobile device to whom the payment must be made and what amount. After authenticating the voice and verifying the transaction through a pin, funds are transferred instantly which carries out the payment process faster and even more securely.
- Intelligent Personal Budgeting, delivers predictive personal financial adviser helping the customer to customize the savings made by setting savings goals for making purchases for goods and services or budgeting for a holiday. This process will intelligently evaluate spending patterns, and thus provide flexible savings options allowing us to choose where, when how to save.
- Frictionless banking, enter any branch, identify automatically using near-field communication (NFC) technology and load the account details for tailoring the service by simply docking the smartphone to the frictionless terminals that provides instant access to details like withdrawal, fund transfer and much more banking operations.
- Self-pay, payment on the palm of the hand which enables to make payments for goods n services by just scanning the QR code. Funds then debited from the customer's account with purchases verified by shops through NFC.

3. RACI Matrix

Responsibility Matrix				
Main Module	Sub Processes	Jaswanth Busnur Jagadeesh	Phanindra Chandraprakash	Rahul Madhusudhan Gudihal
Service Strategy	Strategy Management for IT Services	R/A	C	I
	Service Portfolio Management	R/A	C	I
	Financial Management for IT Services	R/A	C	I
	Demand Management	R/A	C	I
	Business Relationship Management	R/A	C	I
Service Design	Capacity Management	C	I	R/A
	Availability Management	C	I	R/A
	Supplier Management	C	I	R/A
	Security Management	C	I	R/A
Service Transition	Change Management	I	R/A	C
	Change Evaluation	I	R/A	C
	Application Development	I	R/A	C
	Service Management and Testing	I	R/A	C

Image 11: RACI Matrix

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