

Module 1

GHANA GOVERNMENT ENTERPRISE ARCHITECTURE - INTRODUCTION

What is Enterprise Architecture

- **Enterprise Architecture**
- **a strategic** information asset base, which defines the mission, the information necessary to perform the mission and the technologies necessary to perform the mission, and the transitional processes for implementing new technologies in response to the changing mission needs. An enterprise architecture includes a baseline architecture, target architecture, and a sequencing plan.

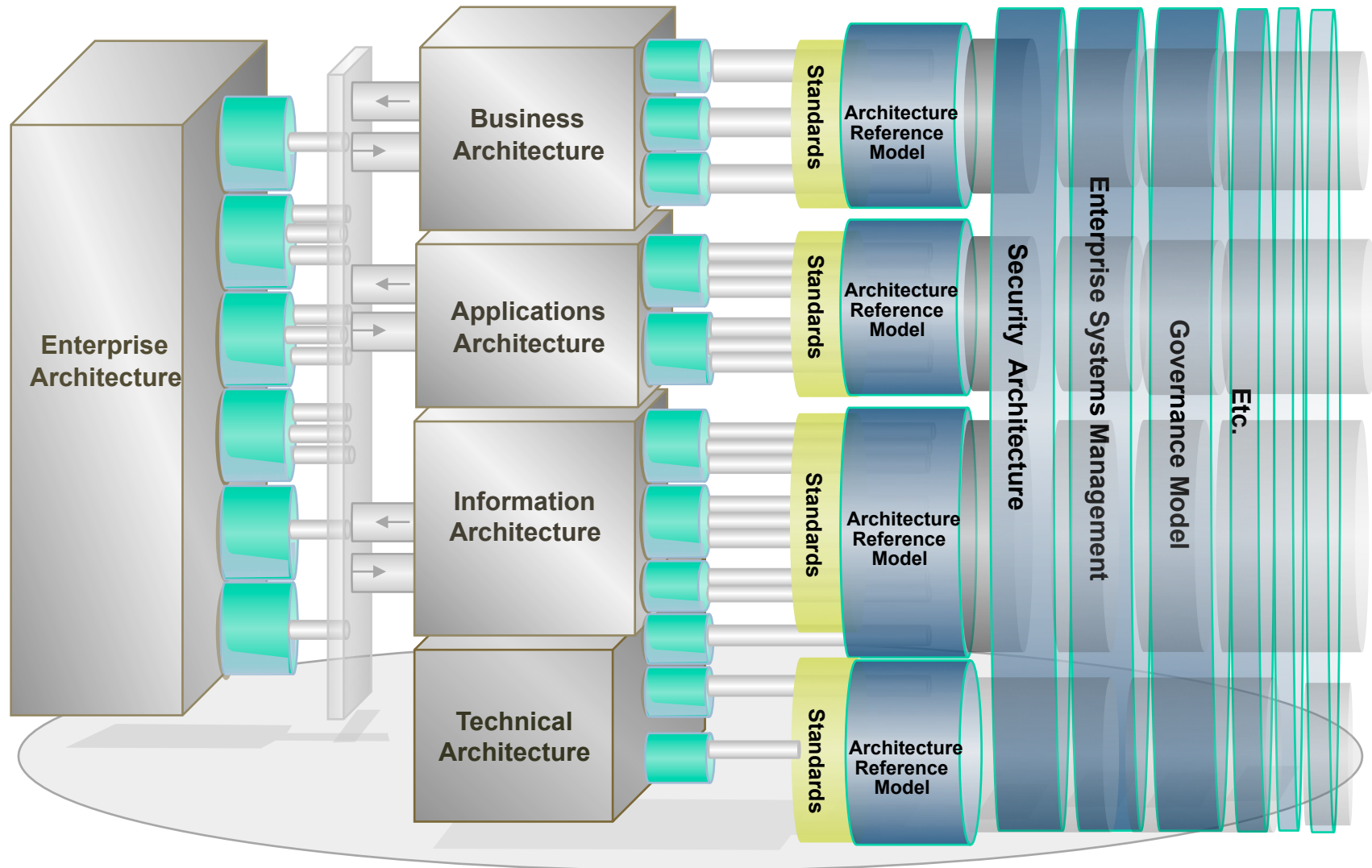
What is Enterprise Architecture?

- **Enterprise Architecture** is the organizing logic for business processes and IT infrastructure reflecting the integration and standardization requirements of the firm's operating model.

Types of Enterprise Architecture

- TOGAF
- FEAF
- eTOM
- Enterprise Unified Process
- Zachman

EA to drive change



Uses and Benefits of EA

- **Alignment**
- **Integration**
- **Change facilitating and managing**

Uses and Benefits

- Capture facts about the mission, functions, and business foundation in an understandable manner to promote better planning and decision making
- Improve communication among the business organizations and IT organizations within the enterprise through a standardized vocabulary

Benefits

- **Information Sharing and collaboration;**
- **Seamless, One-stop-shop;**
- **Benefits;**
- **Information Security;**
- **Self Service;**
- **Management Decision Support;**
- **Process Efficiencies;**
- **Shared Infrastructure.**

Components of GGEA

- **Business Architecture Reference Model (BARM)**
- **Applications Architecture Reference Model (AARM)**
- **Technical Architecture Reference Model (TARM)**
- **Data Architecture Reference Model (DARM)**
- **Security Architecture Reference Model (SARM)**
- **Performance Reference Model (PRM)**

Business Architecture Reference Model (BARM)

- **Business Architecture Reference Model (BARM)** – defines a functional view of government's business processes.

Applications Architecture Reference Model (AARM)

- **Applications Architecture Reference Model (AARM)** – is a driven view of the applications architecture.

Technical Architecture Reference Model (TARM)

- **Technical Architecture Reference Model (TARM)** – is technology driven model.

Data Architecture Reference Model (DARM)

- **Data Architecture Reference Model (DARM)** – the (DARM) is intended to promote the common identification, use, and appropriate sharing of data/information across the Government of Ghana through the standardisation of data. It defines the broad data entities across Government and their properties.

Security Architecture Reference Model (SARM)

- **Security Architecture Reference Model (SARM)**
 - this defines the security framework that supports the applications and technical infrastructure to support the MDAs.

Performance Reference Model (PRM)

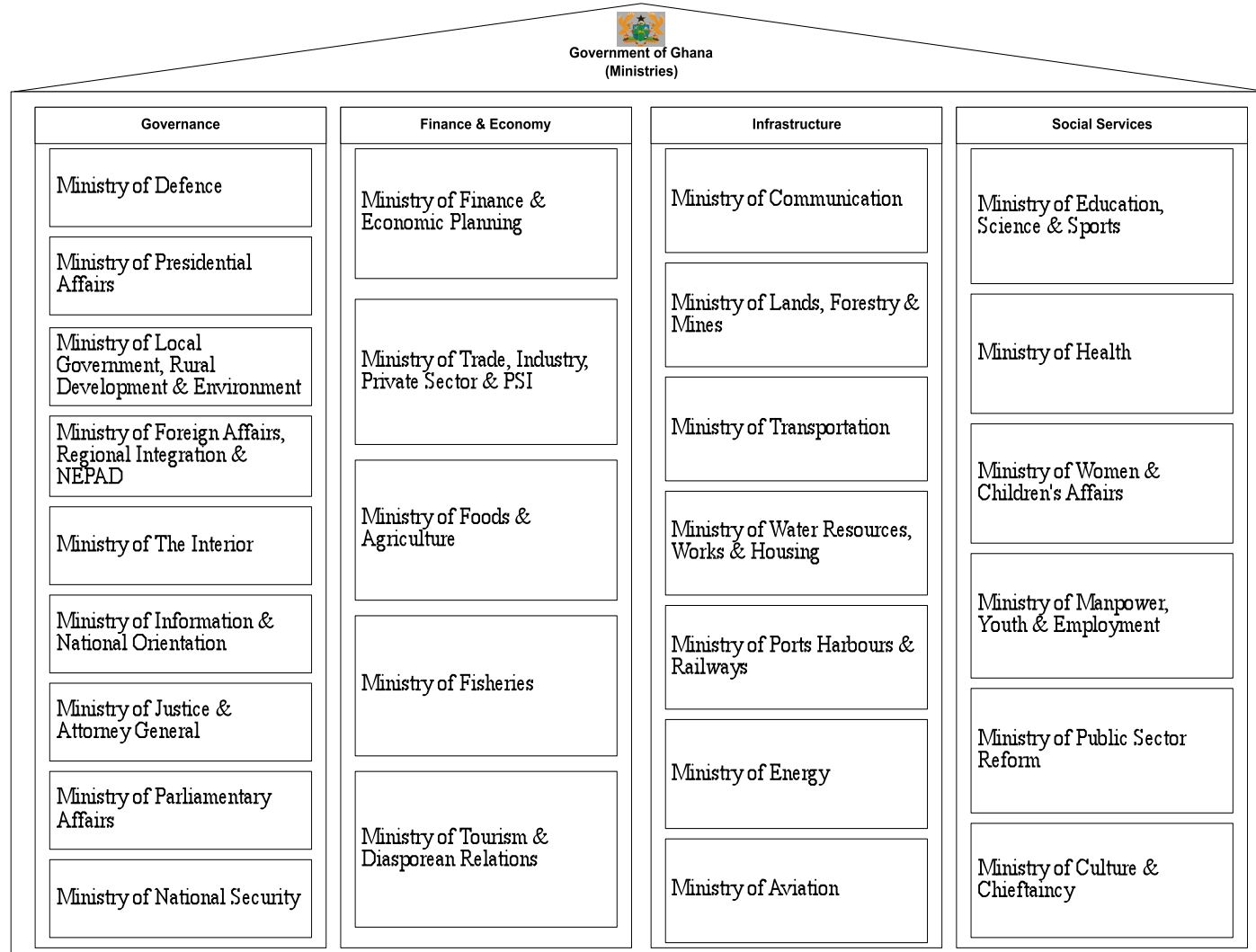
- **Performance Reference Model (PRM)** - is a framework for measuring ICT performance in the MDAs.

Module 2

UNDERSTANDING GHANA GOVERNMENT STRUCTURES

Structure of Government

Ghana Government Structure Diagram



Definition: Ministry

- Ministries have types of Departments and Agencies both of whom provide services to recipients consisting of citizens, businesses, other MDAs and other Governments.

Definition: Department

- Departments work on behalf of and report directly to the Minister or Ministry.

Definition: Agency

- Agencies and some Divisions are autonomous in their management but still deliver or implement services on behalf of a Ministry or the Government.

Users of Government Services

- There are effectively five types of users of e-Government services:
 - Citizens;
 - Community groups and associations;
 - Employees of Government;
 - Businesses and industry;
 - Other Government services and MDAs.

Users of Government Services

- Citizens
- Community groups and associations:
- Employees of Government;
- Businesses and industry;
- Other Government services and MDAs.

Module 3

BUSINESS ARCHITECTURE REFERENCE MODEL

BARM

- The Business Architecture Reference Model (BARM) provides a framework.
- It reflects a functional view of the Ghana Government's business domains.
- It promotes MDA collaboration and serves as an underlying foundation for the eGovernment implementation strategy.

BARM

Purpose of Government	Government Frontline Services
Mechanisms Used to Achieve Purpose	Service Delivery Modes
Government Operations Support Functions	Government Services Support
Resource Management Functions	Enterprise Management

Government Frontline Services

- The Government Frontline Services domain describes the mission and purpose of Ghana Government in terms of the services it provides to and on behalf of the Ghanaian citizen or business.

Government Frontline Services

Purpose of Government	Government Frontline Services
	(0100) Agricultural Services; (0200) Arts and Culture; (0300) Community and Social Infrastructure Services; (0400) Disaster Management; (0500) Economic Development; (0600) Education; (0700) Environment Management; (0800) Foreign and Diplomatic Affairs; (0900) General Science and Innovation; (1000) Good Governance; (1100) Health; (1200) Judicial; (1300) Law Enforcement; (1400) Manpower; (1500) National Defence and Security; (1600) Natural Resources; (1700) Public Utility; (1800) Social Welfare; (1900) Sports; (2000) Transportation.

Service Delivery Modes

- The Service Delivery Modes business area is tightly coupled with the Frontline Services domain in that it describes the mechanisms used by Government to achieve its purposes i.e. it represents the vehicle by which the Ghana government delivers services to its citizens.

Service Delivery Modes

Mechanisms Used to Achieve Purpose	Service Delivery Modes
	(3100) Advocacy; (3200) Citizen Safety; (3300) Credit and Insurance; (3400) Financial Assistance; (3500) Knowledge Development and Management; (3600) Marketing; (3700) Natural Resource Preservation; (3800) Public Infrastructure Management; (3900) Regulations and Compliance.

Government Services Support

- The Government Services Support domain describes the provision of critical policy, programmatic and managerial foundation to support MDA service delivery operations.
- This section provides detailed descriptions of the Business Reference Model (BRM) codes associated with each Domain, Business Process and Sub-Business Process and detailed descriptions of the various elements within Government Services Support.

Government Services Support

Government Operations Support Functions	Government Services Support
	(3100) Advocacy; (3200) Citizen Safety; (3300) Credit and Insurance; (3400) Financial Assistance; (3500) Knowledge Development and Management; (3600) Marketing; (3700) Natural Resource Preservation; (3800) Public Infrastructure Management; (3900) Regulations and Compliance.

Enterprise Management

The Enterprise Management domain describes the support activities that enable the Government and MDAs to operate efficiently. This section provides the Business Reference Model (BARM) codes associated with each Domain, Business Process and Sub-Business Process and detailed descriptions of the various elements within Enterprise Management.

Enterprise Management

Resource Management Functions	Enterprise Management
	(5100) General Administration; (5200) Audits; (5300) Financial Management; (5400) Human Resource Management; (5500) Information and Technology Management; (5600) Supply Chain Management.

Future Amendments

- Any changes or amendments to MDA functions or business processes should be done in close consultation/reference to the Civil Service Law, 1993 (Act 327). This legal reference should be a guide to any person/Ministry/Department/Agency implementing functional or process changes in order to avoid creating dysfunctional units or confusion in the process.

Module 4

SERVICE ARCHITECTURE REFERENCE MODEL

Service Architecture Reference Model

- **Service Architecture Reference Model**
- The Service Architecture Reference Model (SARM) defines the application services respect to how they support business and performance objectives. It serves to identify and classify the application layers that support MDAs and their IT investments and assets from applications perspective.

The SARM Principles

- The architecture principles apply to all government MDAs and the only way the ICT organisation can provide a consistent and measurable level of quality information to decision makers is if all organizations abide by the principles. Without this principle, exclusions, favouritism, and inconsistency would rapidly undermine the management of information.

Principle 1: Delivering Maximum Value to Government

- Information systems decisions must be made to provide maximum value to the Government as a whole.

Principle 2: Compliance with Law

- Government information technology management processes comply with all relevant laws, policies, and regulations.

Principle 3: IT Responsibility

- The ICT organizations of the MDAs are responsible for owning and implementing ICT processes and infrastructure that enable solutions to meet user defined requirements for functionality, service levels, cost, and delivery timing.

Principle 4: Protection of Intellectual Property (IP)

- Government of Ghana's Intellectual Property must be protected at all times and this protection must be reflected in ICT architectures, implementation, and governance processes.

Principle 5: Common Use Applications

- Development of applications used across Government is preferred over the development of similar or duplicative applications which are only provided to a particular MDA.

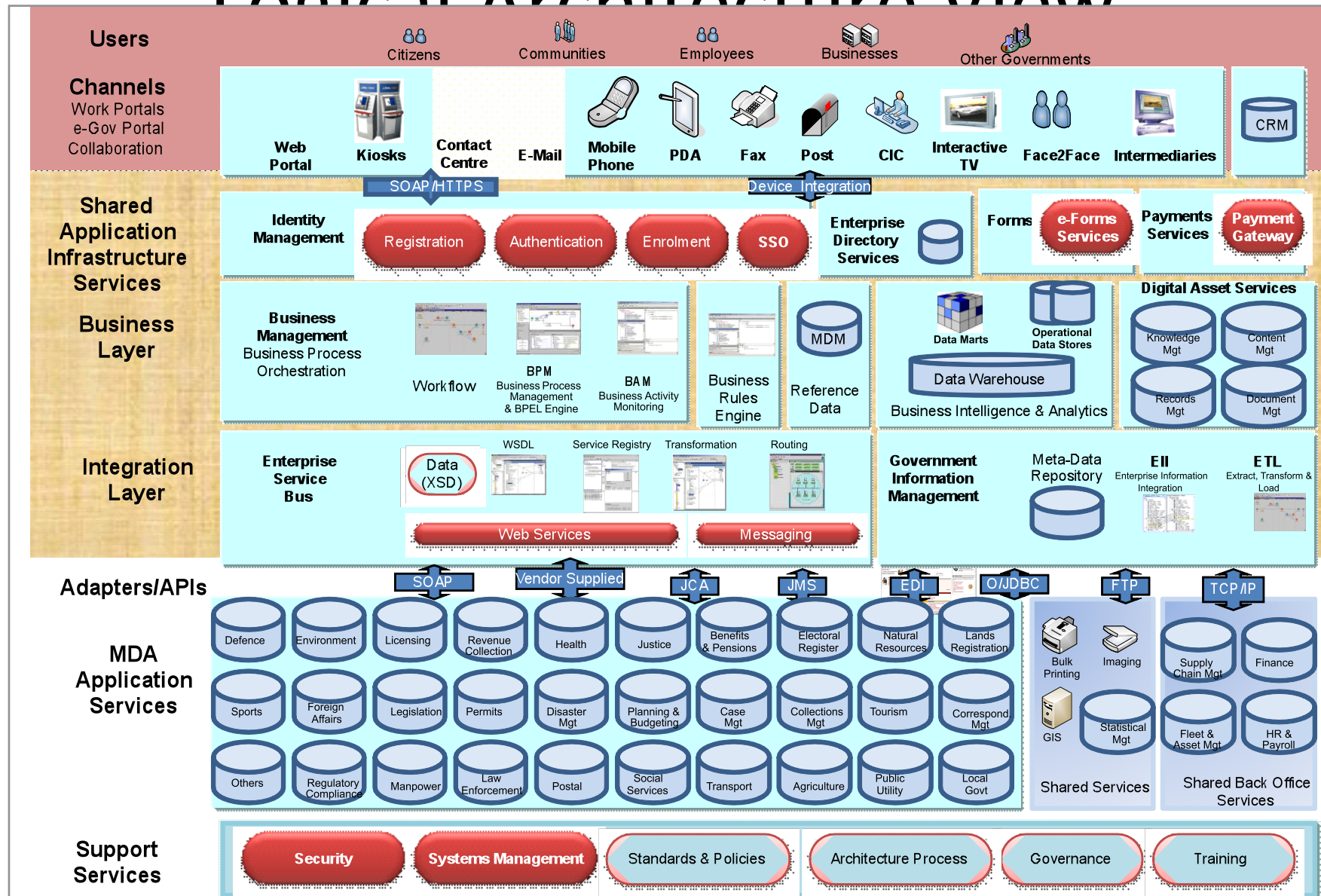
Principle 6: Technology Independence

- Applications are independent of specific technology choices and therefore can operate on a variety of technology platforms.

Principle 7: Ease of Use

- Applications must be easy to use. The underlying technology must be transparent to users, so they can concentrate on tasks at hand.

Logical Architecture View



Channel Strategy

- The channel strategy involves identifying the different modes of service delivery, which is the interaction between the user and the Government and the type of interaction

Channel Strategy Groupings

- **Dissemination of Information:** This category focuses on promoting and marketing government services, educating citizens, organisations and other governments on the various services delivered by government as well as awareness creation.

Channel Strategy Groupings

- **Notification:** This category deals with government informing citizens, organisations and other government about events and activities.

Channel Strategy Groupings

- **Payment Transaction:** Deals with any agreement, communication or movement carried out between separate entities often involving the exchange of money. The entities here are citizens, organisations and government.

Channel Strategy Groupings

- **Registration:** for government services.

Channel Strategy Groupings

- **Subscription:** An agreement with another company or institution that gives one the right to receive information. May sometimes involve the payment of a sum of money.

Channel Strategy Groupings

- **Service Rendering:** Refers to a service offered to citizens by any of the Ministries, Departments and Agencies that originally has not been requested for. For instance services offered by charity organisations and entities.

Channel Strategy Groupings

- **Request:** The act of citizens asking for something to be done. A request is followed by a delivery of the service being asked for. Request can be from citizens to government or vice versa.

eGovernment Channels

- Web Portal: The Web Portal is the most comprehensive and visible electronic Government channel.
- A government wide Portal to public services from one delivery channel.

eGovernment Channels

- Home page display and user log-in;
- Search for and display content;
- Access MDA applications services and data.

eGovernment Channels

- User updates personal;
- User updates his/her portal preferences and personalises his/her portal home page;
- Submit an inquiry;
- Hold an impromptu e-meeting ;
- Create or edit a document or forms.

eGovernment Channels

- The Government of Ghana Portal will present information from diverse sources in a unified way and provide services such as search engine, e-mail, news, forums and other features.
- Some MDAs such as Municipalities will also develop their own Work Portals which will be consistent with the features and “look and feel” as the central government’s Portal

Web Portal Services Examples

The Ghana Government Web Portal		
Index	Business Domain	Description
0100	Agricultural Services	Dissemination of Information: Farmers can access data about supply stores which implement government subsidies. They can also learn of farming technologies that increase their yield. They have direct access to information on economic/market changes that enable real time adjustments.
0200	Arts and Culture	Dissemination of Information: Blogs can be used to educate citizens or promote art, culture and History of Ghana. It can also enable users to view artefacts. General information such as locations of monuments, national parks, etc, can be found here. Request: Information can be requested through blogs.

eGovernment Channels

- Email: Electronic mail, often abbreviated Email, is a means of writing, sending, receiving and saving messages over electronic communication systems. It also applies to the internet e-mail system based on the Simple Mail Transfer Protocol.

Email Services Examples

Email		
Index	Business Domain	Description
0200	Arts and Culture	Dissemination of Information: Citizens education on arts and culture can be facilitated by sending emails that inform citizens of cultural and historical issues of Ghana. Notification: Historical and cultural events, e.g. festivals etc can be announced to citizens both living in the country and abroad by sending mass e-mails.
0300	Community and Social Infrastructure Services	Notification: Citizens can send e-mails informing authorities of abandoned road construction works and building projects, issues involving sanitation in the community and occurrence of accidents. Citizens can take pictures of bad roads and abandoned projects and attach them to e-mails for appropriate action to be taken.

eGovernment Channels

- Fax: A telecommunications facsimile machine used to transfer copies of documents. Sending and receiving fax messages requires a fax machine and phone line and is a well used channel in Government.

Fax Services Examples

Fax		
Index	Business Domain	Description
0100	Agricultural Services	Notification: Faxing will enable prices of subsidised agricultural materials and tools for farming, fishing and lumbering to be communicated to farmers. New initiatives by the Ministry of Agriculture can be communicated to farmers through their representatives in various districts across the country. Dissemination of Information: Reports and findings of scientific and investigative activities for the promotion of new technologies in the agricultural sector can be shared among officials of the agricultural ministry through fax.
0200	Disaster Management	Notifications: Information concerning news of disasters such as floods, storms etc can be communicated to citizens and organisations that are likely to be affected by sending fax messages. Dissemination of Information: Response programmes and measures put in place in preparedness for a disaster could be communicated to all officials of the national disaster management organisation by fax message.

eGovernment Channels

- Post: Mail, or post, is a method for transmitting information and tangible objects, wherein written documents, typically enclosed in envelopes, and also small packages, are delivered to destinations around the world.

Post Services Examples

Post		
Index	Business Domain	Description
0100	Agricultural Services	Notification: Price releases of agricultural tools and equipment for farming, fishing and lumbering can be sent by post to farmers and fishermen upon request. Also reports and scientific findings of other investigative activities can be shared among stakeholders of agriculture e.g. farmers and officials of the Ministry of Agriculture.
0200	Arts and Culture	Dissemination of Information: With the appropriate collaboration with Ghana Postal Service, the NCCE can enhance education on the cultural history and heritage of Ghana by leafleting the post office box of citizens.

eGovernment Channels

- Telephone: This channel utilises the standard telephony device used to transmit and receive sound (most commonly speech), usually users calling specified telephone numbers of the MDAs for advice or information.

eGovernment Channels

- Automatic Number Identification (ANI)
- Dialed Number Identification Service (DNIS)
- Automatic Call Distribution (ACD) Predictive dialling

eGovernment Channels

- Computer/Telephone Integration (CTI)
- Interactive Voice Response systems (IVR)
- Speech-enabled systems.

Telephone Services Examples

Phone		
Index	Business Domain	Description
0100	Agricultural Services	Notification: Farmers can call the Ministry of Agriculture to make enquiries about prices of tools and equipments for farming, fishing and lumbering.
0200	Arts and Culture	Request: Citizens can call authorities requesting for information pertaining to their culture and national/regional history.
0300	Community and Social Infrastructure Services	Notification: Citizens can make complaints about bad roads, bad sanitation and refuse, faulty traffic lights etc to the district and metropolitan assemblies via phone.
0400	Disaster Management	Notification: Citizens can make phone calls to offices of disaster management authorities informing them of an outbreak of a disaster.

eGovernment Channels

- Intermediary: An intermediary is a third party that offers mediation services between two parties.

Intermediary Services Examples

Intermediaries		
Index	Business Domain	Description
0100	Agricultural Services	Dissemination of Information: Chiefs and NGO's can educate farmers on government policies concerning agriculture. Also supply and distribution of agricultural tools for farming, fishing and lumbering can be done through intermediaries. They can also offer training and advisory services to farmers. Intermediaries can also mediate for farmers to get access to loans from government to boost their businesses. Agricultural products can also be promoted through intermediaries.
0200	Arts and Culture	Dissemination of Information: Intermediaries play a role in the cultural and historical preservation of their communities and the nation as a whole through the frequent organisation of programs and activities that are deeply rooted in culture. Cultural artefacts can also be promoted through the organisation of fairs and exhibitions to display works of various artists. Also intermediaries are useful in the mediation process of conflict resolution.

eGovernment Channels

- **Face-to-face:** Face-to-face refers to direct interactions or meetings between people in real life .

Face to Face Services Examples

Face-to-Face		
Index	Business Domain	Description
0100	Agricultural Services	Dissemination of Information: Through agricultural extension officers, knowledge on skills, techniques, tools for management of agricultural and fishing activities can be passed on to farmers.
0200	Arts and Culture	Dissemination of Information: citizens education on arts and culture can be enhanced by the organisation of programs and activities and visits to places of historical and cultural significance such as museums, monuments etc.

eGovernment Channels

- **Wireless including mobile phone:** In addition to the standard voice function of a telephone, the mobile phone is an important channel for e-government in the delivery of government services such as the dissemination of information.

Wireless Services Examples

Mobile		
Index	Business Domain	Description
0100	Agricultural Services	Notifications: Notifications of price increases and new prices of tools, equipments, seeds, seedlings can be sent to farmers via SMS.
0200	Arts and Culture	Dissemination of Information: Citizens education and capacity building on arts, culture and historical issues of Ghana can be enhanced via SMS Competitions and games with the answers provided by citizens via SMS. Notifications: Invitations to cultural functions/events can be sent to citizens on mobile phones via SMS.

eGovernment Channels

- **Interactive television:** iTV describes a number of techniques that allow viewers to interact with television content as they view it.

Interactive TV Services

Mobile		
Index	Business Domain	Description
0100	Agricultural Services	Dissemination of Information: General Government agric initiatives such as where to purchase subsidised farming equipment can be provided here. Request: Forms pertaining to agricultural services such as applying for a license to fell timber can also be requested.
0200	Arts and Culture	Dissemination of Information: This device can be used to promote such things as cultural and historical preservation and arts and culture promotion.

eGovernment Channels

- **Self Service Kiosks:** A kiosk is a self service device with onboard computer and a display screen that displays information for people walking by.

Self-Service Kiosks Services Examples

Self Service Kiosks		
Index	Business Domain	Description
0100	Agricultural Services	Dissemination of information: Provide access to information (possibly in local language) about crops and agricultural market prices, employment schemes from the government of Ghana for marginalized population (women, youth), and educational opportunities. Notification: It can also provide information on subsidies and educate farmers and fishermen on special government initiatives, as well as facilitate them, and enhance knowledge-base (through internet as well). These kiosks can be placed in key areas such as cooperatives, general meeting places for farmers and fishermen and local MMDA offices such as assembly offices.
0200	Arts and Culture	Dissemination of Information: Exhibitions of Ghanaian artists (old and new) as well as Ghanaian artefacts can be made available at these kiosks to promote arts and culture. The Kiosks would serve mainly as Arts and Culture centres found in places such as airports and even museums.

eGovernment Channels

- **Citizen Information Centres (CIC):** A CIC is a building with individuals tasked with the job of providing information about Government's activities to enquiring citizens.

eGovernment Channels

- **Citizen Segmentation:** Users of e-Government channels are diverse and to be able to deliver quality services, the services should be tailored to the needs of individual users, as far as this is possible.

Customer Relationship Management

- Customer Relationship Management (CRM) is a business term that refers to the process of relating to your customers to maximize the length and value of that customer relationship.

Citizen Customer

- “Customer” has a broader meaning for government. They include citizens, businesses, community groups, religious groups, military personnel, public interest groups, associations, etc.

CRM Benefits

- Presents a joined up view of government from a citizen's standpoint, reducing information silos and simplifying the movement information across agencies;
- A highly sophisticated view of the citizen, through effective contact management processes and the protection of citizen's privacy;
- Provides access through multiple channel interfaces including the Web Portal, mobile phone, IVR, and face to face;
- Provides information tailored to the citizen's needs and facilitates efficient completion of enquiries and transactions;
- Has been developed with the support needs of citizens in mind with a rich knowledge base to assist service delivery;

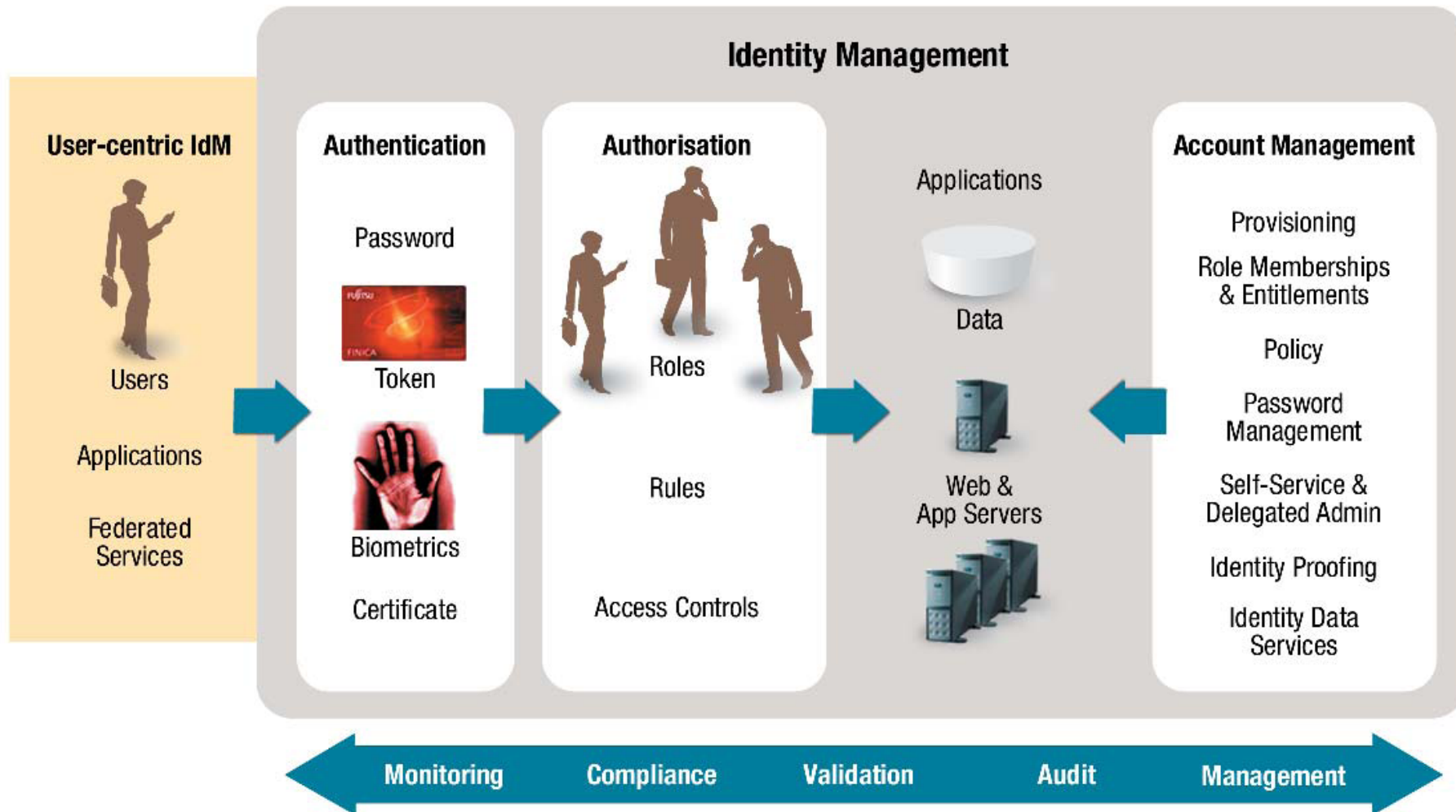
CRM Benefits

- Complaint with laws of the country. The citizen contact history and audit trail retained in order to provide visible and verifiable internal controls for policy, contractual or statutory compliance;
- Promotes continuous improvement of citizen services by incorporating citizen satisfaction monitoring processes. The CRM systems must provide manual or automated citizen survey distributions and tabulations. Alert e-mail notifications can automatically be initiated based on specified survey response results.
- The e-mail integration to provide synchronization of e-mail, contacts, appointments and activities with the email system;
- Ability to tap into online Document Management system and correlate forms and other files with citizens records held in the CRM database;

Components of CRM

- Data collection;
- Data management and analysis;
- The creation of business rules;
- Customer contact application components.

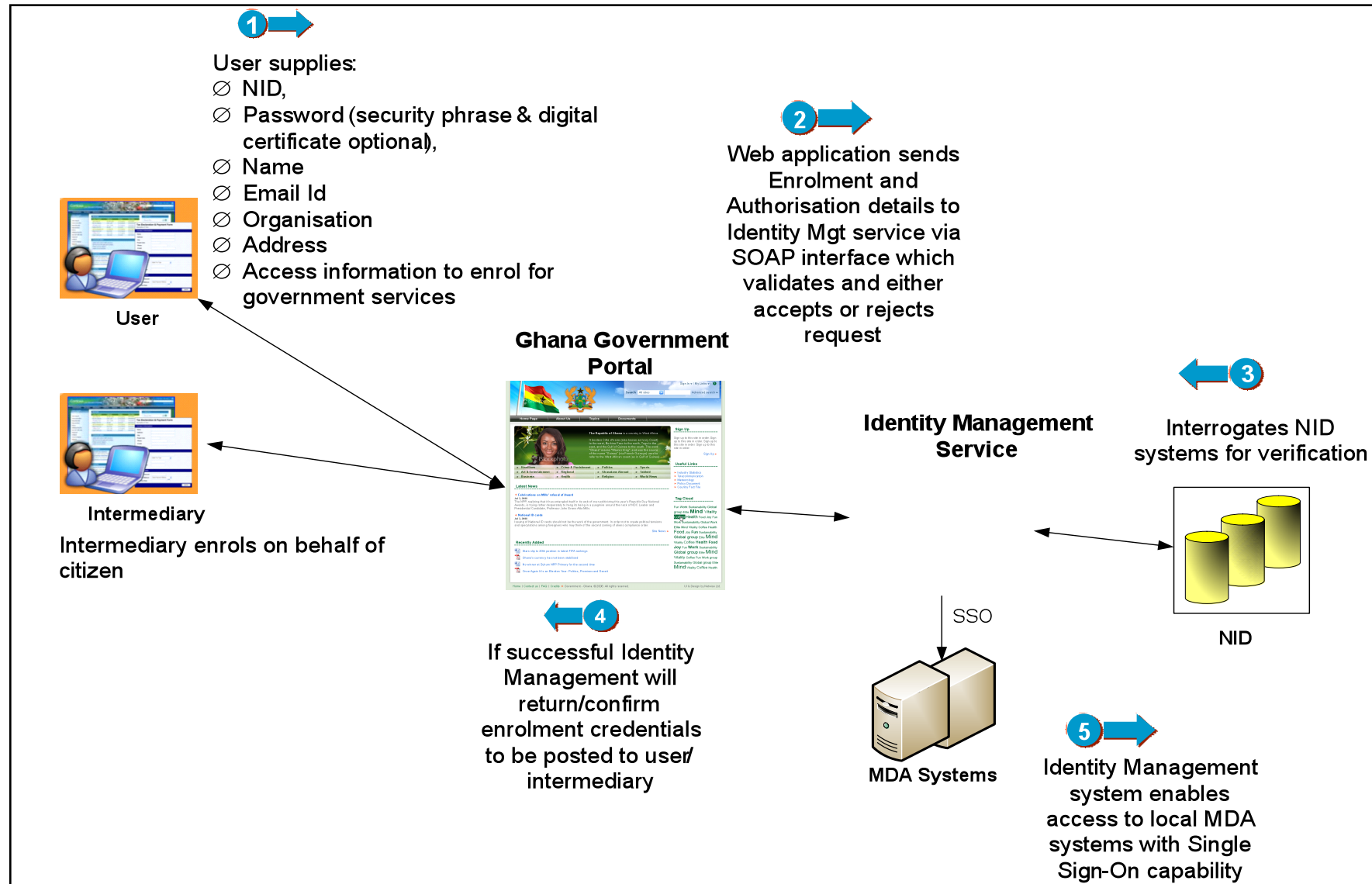
Identity Management



Levels of authentication

- The following four levels of authentication are required:
 - Level 0: no authentication required.
 - Level 1: authentication required to protect against minor inconvenience or loss.
 - Level 2: authentication required to protect against significant inconvenience or loss.
 - Level 3: authentication required to protect personal safety and/or to prevent substantial financial loss to the state

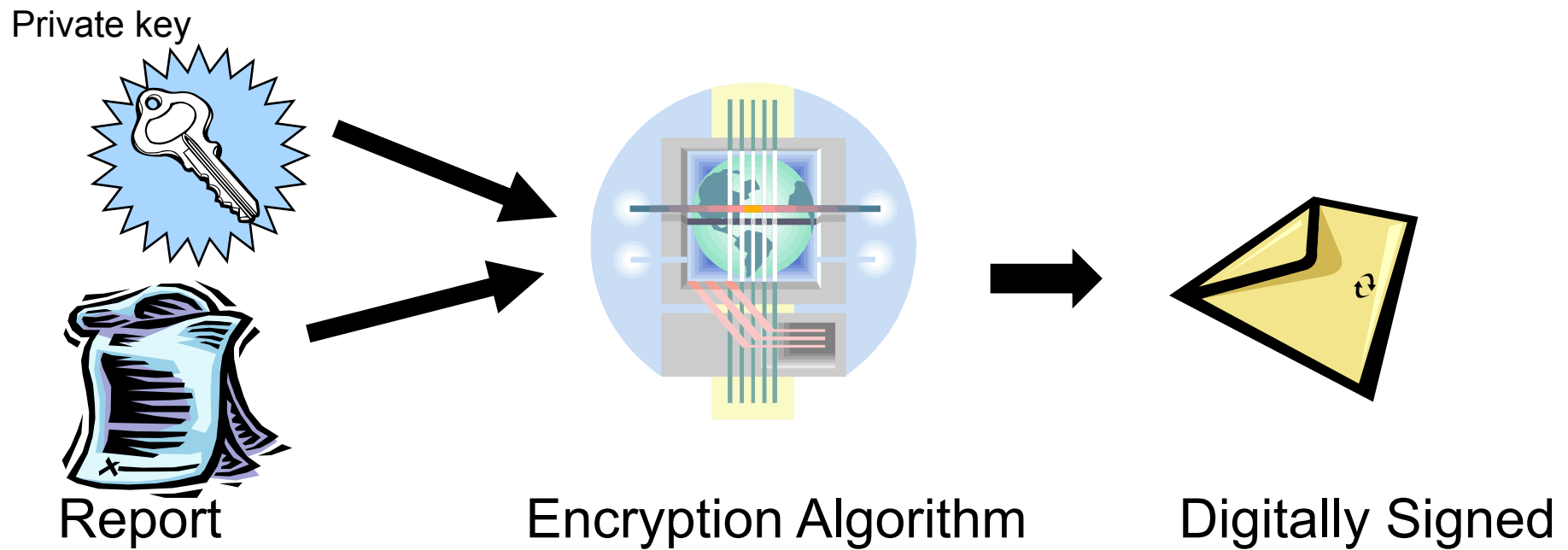
New user Registration



Credentials and User ID

- A credential proves users are who they are and establishes if they are authorised to use a particular piece of software or access a particular system.

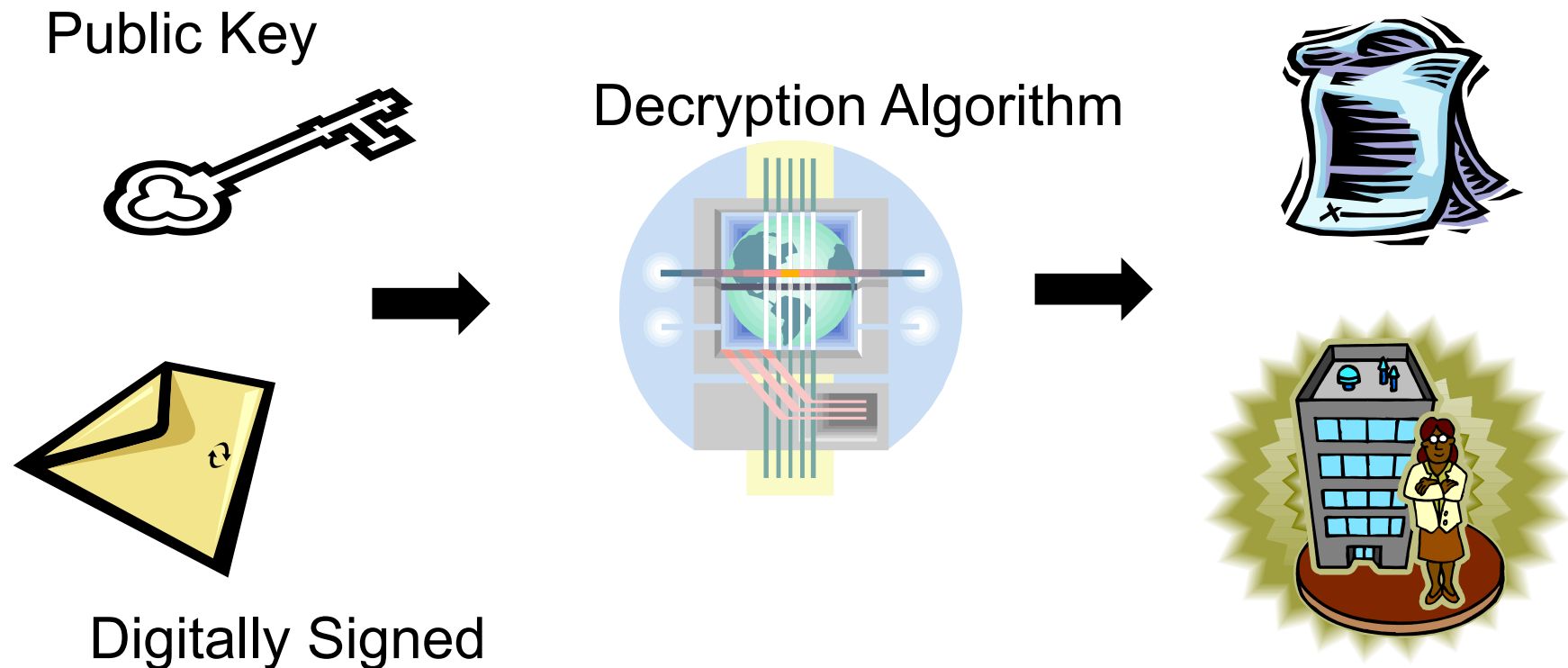
Digital Certificates



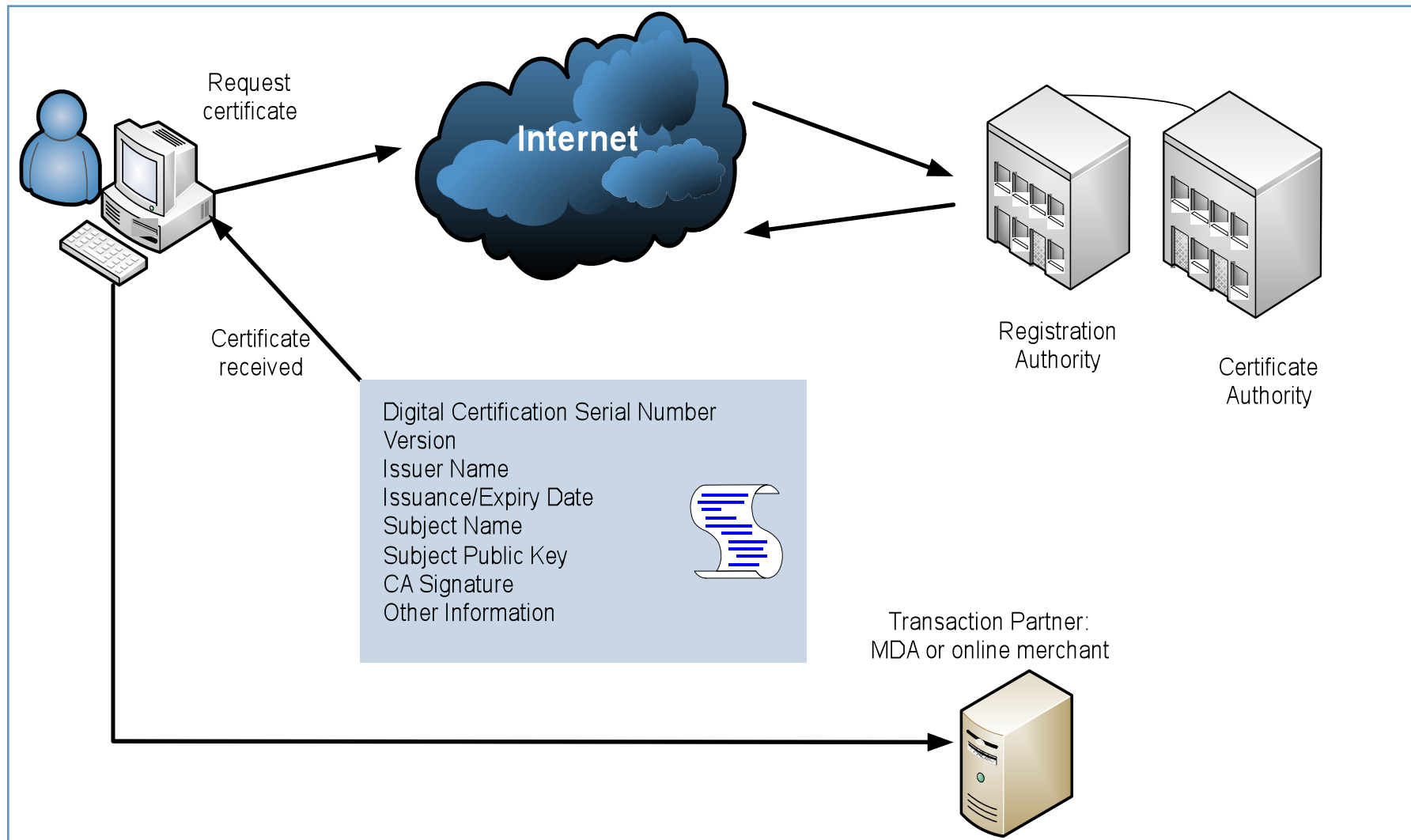
An individual digitally signs a document using the private key component of his certificate.

Digital Certificates

The individual's public key, published by the CA decrypts and verifies the digital signature.



How to get a Certificate



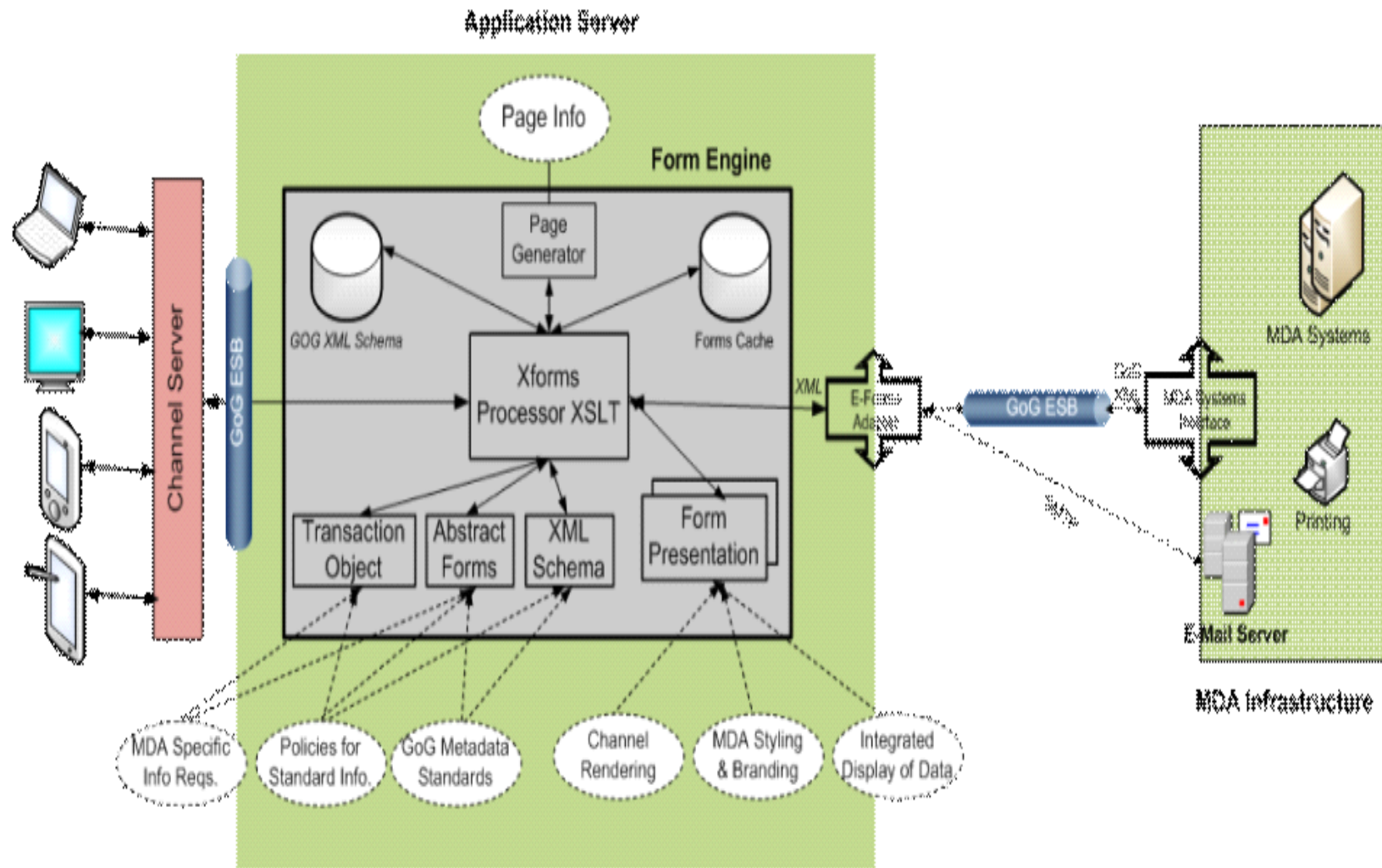
Federated Authentication

- Federated Authentication enables the management of multiple userids and passwords and also facilitates single-sign on.

Electronic forms

- Electronic form is a dynamic document that captures information and submits it in structured way to government agencies for processing.

Electronic Forms



Forms Classification

- ***MDA Name***. This is the name of Ministry, Department or Agency that the form belongs to.

Forms Classification

- ***Type of Service.*** This is the type of service the form will be providing. They include the following:
 - **Approval Services** (Permits), examples are:
 - Program Accreditation;
 - Institutional Accreditation;
 - Environmental Assessment Registration Form;
 - Application for International Driving Permit.
 - **Change Services,** examples are:
 - Change Company Name;
 - Change of company type;
 - Change of name;
 - Application for Upgrade of Drivers License.

Forms Classification

- ***Type of Service***. This is the type of service the form will be providing. They include the following:
 - **Charge services**, examples are:
 - Warrant to Arrest Accused;
 - Statement of Claim;
 - Criminal Form;
 - Justification of Sureties.
 - **Company Registration**, examples are:
 - License to Manufacture Drugs;
 - New Company;

Forms Classification

- ***Type of Service.*** This is the type of service the form will be providing. They include the following:
 - **Information Services**, examples are:
 - Metrology Form;
 - Advice of Transfer of a Registered Trader;
 - Advertisement of Drugs, Cosmetics, Household Chemical Substance and Medical Devices;
 - Adverse Reaction Report Form.
 - **Taxes**: examples are
 - Company Income Tax Returns;
 - Employees Tax Deductions Form;
 - Employee's Schedule of Monthly Tax Deductions;
 - VAT and NHIL Returns.

Forms Classification

- ***Form Number***. This is the unique number given to the form;

Forms Classification

- ***Form Title or Topic.*** This is the title of the form one wants to search.

Searching for Forms

- The user navigates to the search form page;
- If the user enters form title or a form number then the specific form will be generated to fill;
- If the user enters MDA name or Type of Service then a group of forms for that MDA or type of service is generated. The user then selects the specific form to fill.

Filling a Form

- To obtain the initial form (assuming that the user is starting from a blank form):
 - The user navigates to the link to the form page and sends a request to Xform processor via web server;
 - The Xform processor retrieves the form from the Form Cache;
 - The Xform processor sends the form to the user via web server;
 - The user fills the form(enter data into the fields);
 - The WB performs data validation checks for the data entered (using rules embedded within the page displayed to the user) and pops-up a message to the user if an error occurs. Note that the e-Forms system database at this stage has not been updated.

XML Form Submission

- The steps are:
- The e-Form Adapter constructs a suitable GoG XML message containing the details of the transaction;
- The e-Form Adapter identifies the correct adapter to send the transaction to and calls the reliable messaging protocol to send the message to the MDA Systems interface via the GoG eGSB
- The MDA System Interface receives the message and performs the relevant action (e.g. storing in an MDA database and initiating further processing of the information)
- The MDA System Interface then informs e-Form Adapter that the message has been processed.
- The e-Form Adapter informs the Form Cache of the completed status of the transaction
- Finally, the Form Cache stores the status In event of system failure (such as being unable to connect to the adapter, or incomplete transaction by the adapter) then, steps 2-6 are repeated.
- If the problem persists then the e-Form Adapter logs the problem and raises a system alert.

eMail Form Submission

- The e-Form Adapter constructs a suitable email from the transaction message containing the details of the transaction;
- The e-Form Adapter then identifies the correct email address and email server to send the email to and calls the SMTP protocol to send the email;
- The e-Form Adapter informs Form Cache of the “sent email” status;
- Form Cache records the status;
- The MDA staff in charge receives the email and processes it. If an error occurs (such as failure to connect to the email server, or receives information of a failed delivery) then repeat steps 2-5;
- If after a number of repeats the emailing can still not be completed then the e-Form Adapter logs the problem and raises a system alert

MDA Printout Form Submission

- The e-Form Adapter constructs a suitable printed form of the transaction as a file;
- The e-Form Adapter identifies the correct printer to send the file to and puts it onto the printer queue;
- The file is printed and delivered (by a suitable MDA operational procedure) to the relevant member of staff, who then performs the relevant action (e.g. scanning it into the MDA processing system);
- If an error occurs (such as failure to connect to the email server, or receives information of a failed delivery) then repeat steps 2-3;
- If after a number of repeats the print can still not be completed then the e-Form Adapter logs the problem and raises a system alert.

Local Printout Form Submission

- The user requests a version for printing;
- The Xform processor receives the request via web server and generates a printable version of the form;
- It is more appropriate to do this in binary form rather than in XML;
- The Xform processor sends the form to the user via the web server;
- The user receives the form and prints locally.

Form Status Report

- The user may obtain status information on the progress of their transactions, which means the progress on the forms that they have submitted.

MDA System Polling

- At pre-defined time intervals, the e-Form Adapter requests for polling of MDA systems for status information;
- The e-Form Adapter creates a GoG XML message requesting information about all transactions and sends this to the relevant MDA System Interface via the appropriate messaging protocol
- The MDA System Interface retrieves the status changes and returns the changes
- The e-Form Adapter receives the changes and calls the Form Cache to make the necessary status updates.
- If an error occurs, then repeat steps 2-4. If after a number of tries the information can still not be accessed: the e-Form Adapter logs the problem and raises a system alert.
- These additional mechanisms should be provided:
- There should be a re-synchronising of the status of all transactions held on the e-Forms engine with that on the MDA systems.
- There should also be a facility for deleting completed transactions from the e-Forms engine rules.

Payments Systems

- **TYPES OF PAYMENT SYSTEMS**
- Types of payment systems in Ghana and they are:
- Cash
 - Which is legal tender predominantly used to pay for goods and services in Ghana. Cash is generally limited to smaller transaction
- Cheque Transfer
 - Cheques – is normally used for relatively larger transactions. It represents a funds transferred directly via a signed cheque from a consumer's cheque account to a merchant or other individual.

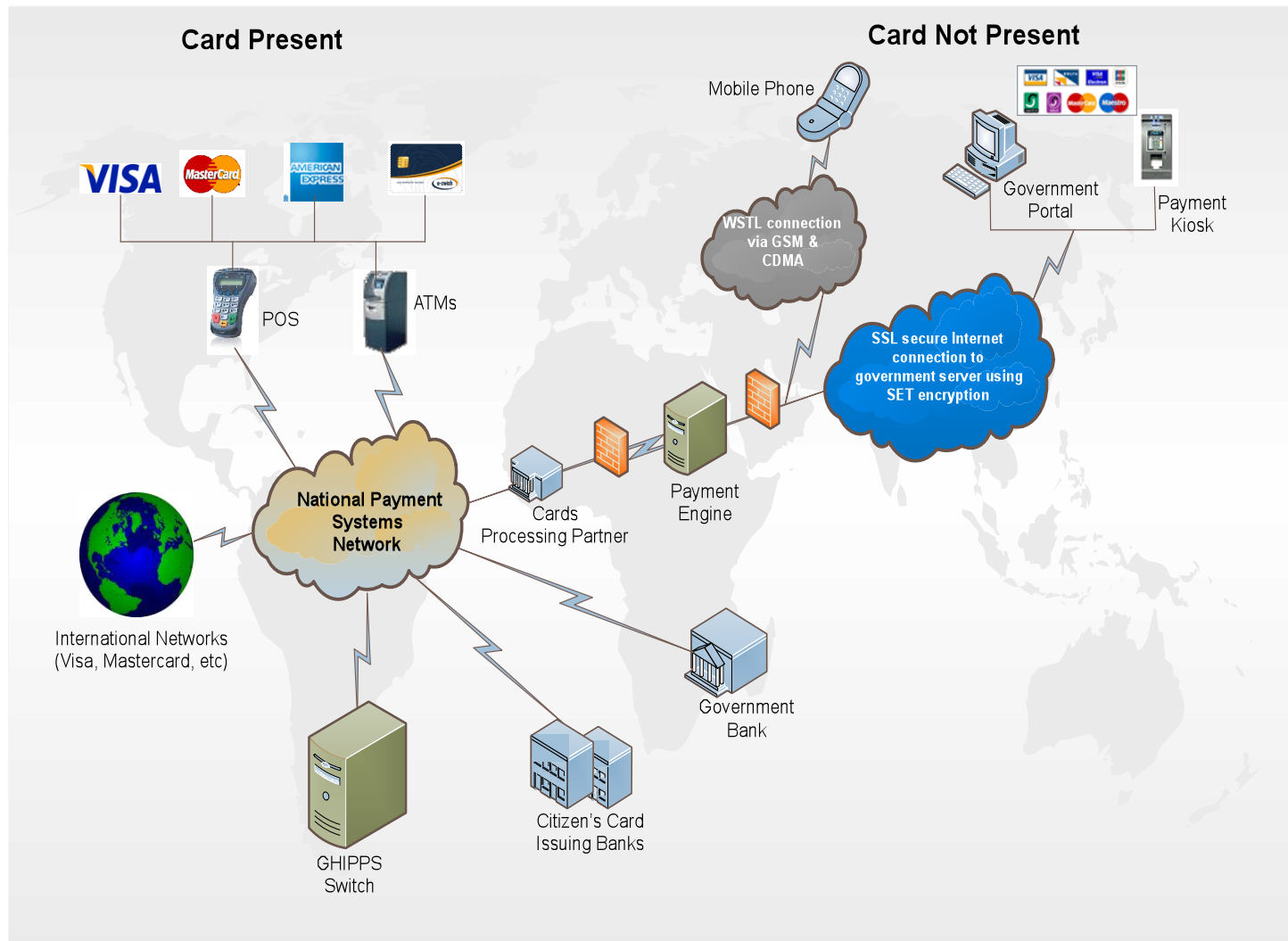
Payments Systems

- e-Zwich
 - The Bank of Ghana (BoG) has established the Ghana Interbank Payments and Settlement Systems Limited (GhIPSS), as an independent organisation to manage the operation of the different components of Ghana's payment and settlement system infrastructure. The systems deployed include the national switch (the e-Zwich) and a biometric smartcard (e-Zwich card). GhIPSS is also supposed to provide Real Time Gross Settlement System (RTGS) and Automated Clearing House (ACH). The e-Zwich card is used at UEPS based Point-of-Sale terminals for paying for goods and services
- Debit/Credit Cards
 - Debit and credit cards usage is still very much in its infancy in Ghana for paying for goods and services. Visa is the main card association currently operating in Ghana with a few third parties or clearinghouses to handle the verification of accounts and balances. Credit card and Debit card systems are generally inappropriate for very large or micro transactions due to their high fees and are only used in a 'card present' setting.

E-Payment Gateway

- The introduction of e-Government has created new financial needs that in many cases cannot be effectively fulfilled by traditional payment systems

e-Payment Service Architecture



SMS Based Micropayments

- SMS payments via Cell phones

SMS Based Micropayments

- Bluetooth SMS payments via Cell phones

Business Process Management

- The GGEA identifies Business Process Management (BPM) as an important component of the architecture to increase employee and citizen value through innovative, flexible and efficient orchestration of Government's business processes.

BPM Standards

- Support for standards such as the following is critical to the implementation of BPM in Government

BPM Standards

- Business Process Execution Language (BPEL) - the current WS-BPEL 2.0 standard, commonly called BPEL, has been ratified as an OASIS standard. The WS-BPEL 2.0 standard does not currently have any provision for supporting human interaction. It is more focussed on Web Services interaction with the business process. However industry vendors are now working on BPEL4People as an important initiative to standardise the integration of human workflow activities into business processes.

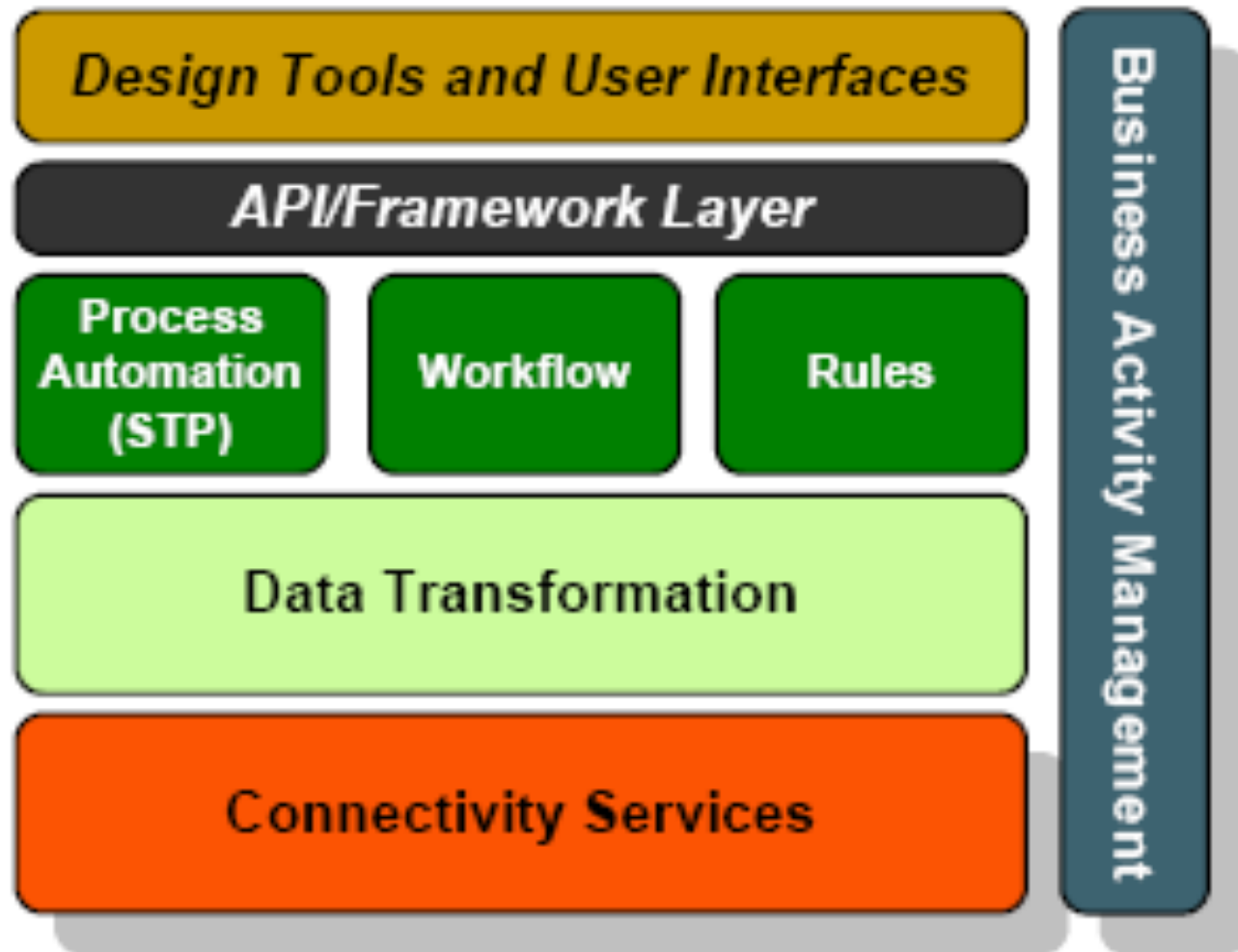
BPM Standards

- Business Process Modelling Notation (BPMN) – is a graphical notation that depicts the steps in a business process.

BPM Standards

- Unified Modelling Language (UML) – is an OMG's specification that addresses the way that Government application structure, data structure and architecture will be modelled.

BPM Architecture



BPM Features

- **Design tools and user interfaces** – to enable business process automation to be designed easily the BPM tools should be intuitive and easy for business users to use

BPM Features

- **API/framework layer** – the BPM solution must offer a well-published application programming interface (API) that will enable the solution to be integrated with a number of disparate systems.

BPM Features

- **Process automation, workflow, and rules engine** - process automation is a key capability inherent within BPM solutions.

BPM Features

- **Data transformation** - interactions between different systems that automate business processes will sometimes require the exchange of data.

BPM Features

- **Connectivity services** - by a number of technologies, such as adapters, Web Services, integration servers, etc.

BPM Features

- **Business Activity Management (BAM)** – is a new addition to BPM solutions. BAM capabilities will allow MDAs to measure the effectiveness of their business processes and provide analysis for improvements.

Master Data Management

- Master data (also known as reference data) represents the Government's business entities, terminology, definitions and classifications used to describe business information.

MDM Technical Issues

- Different systems deployed by the MDAs require different forms of identifiers;

MDM Technical Issues

- Some systems allocate identifiers themselves or constrain the choice of identifier for individuals or system resources so that the user organisation cannot give an individual or system resource a single identifier that does not change over time and can be used in all instances of the product or system within the organisation;

MDM Technical Issues

- Technical limitations require identifier changes that are unrelated to business reasons, making the process of identifier management unnecessarily complex

MDM Technical Issues

- Usage of identifiers across organizational boundaries is difficult, complex, and unreliable

MDM Business Implications

- There is a significant cost overhead in translating identifiers between systems and to user-friendly forms

MDM Business Implications

- Forced identifier changes carry significant cost overheads.

MDM Business Implications

- Service provision is more complex and difficult than is necessary

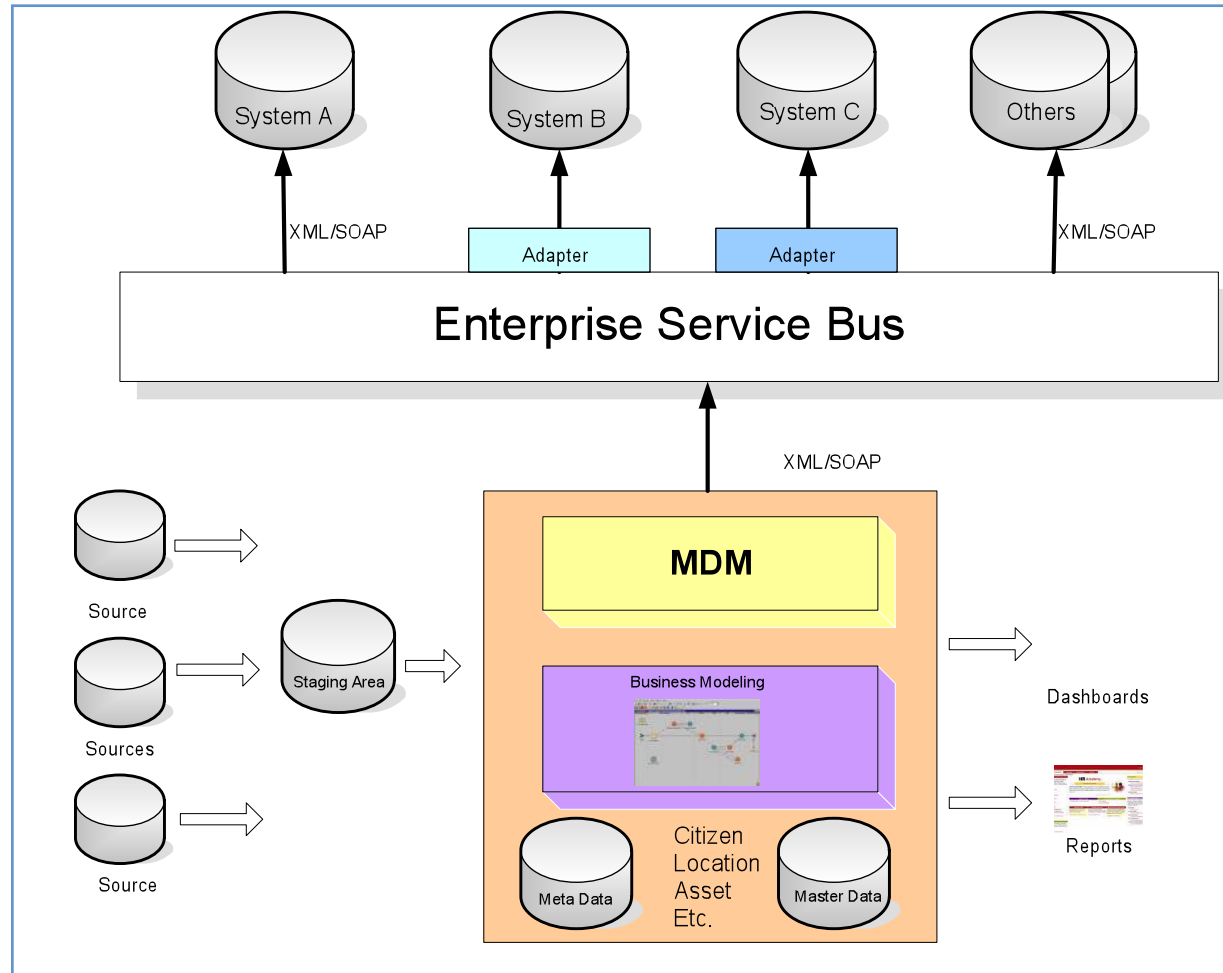
MDM Business Implications

- Collaboration between MDAs is inhibited

MDM Business Implications

- Audit and event tracking is more difficult, making it harder to maintain business standards and comply with regulation

MDM Architecture



MDM Solution

- The MDM solution must
 - Consolidate master data from disparate IT systems;
 - Support complex master data models;
 - Be business-user driven to validate the completeness, semantic correctness and referential integrity of master data;
 - Be business-user accessible to improve business transparency and operational efficiency

MDM Solution

- The MDM solution must
 - Map between multiple master data views (e.g., global and local);
 - Preserve master data history Interface with enterprise data warehouses to help ensure business analysis and reporting consistency;
 - Be easy to implement with little impact on operational systems.

Business Intelligence (BI) and Analytics

- The objective of the GGEA Business Intelligence solution is to provide on-demand analytics for both real time and non real time and decision making.

BI Capabilities

- A real time operational data store that will contain information captured from operational business systems as the data is created or updated.

BI Capabilities

- An analysis engine that can generate and/or provide access to current business analyses from any place and at any time.

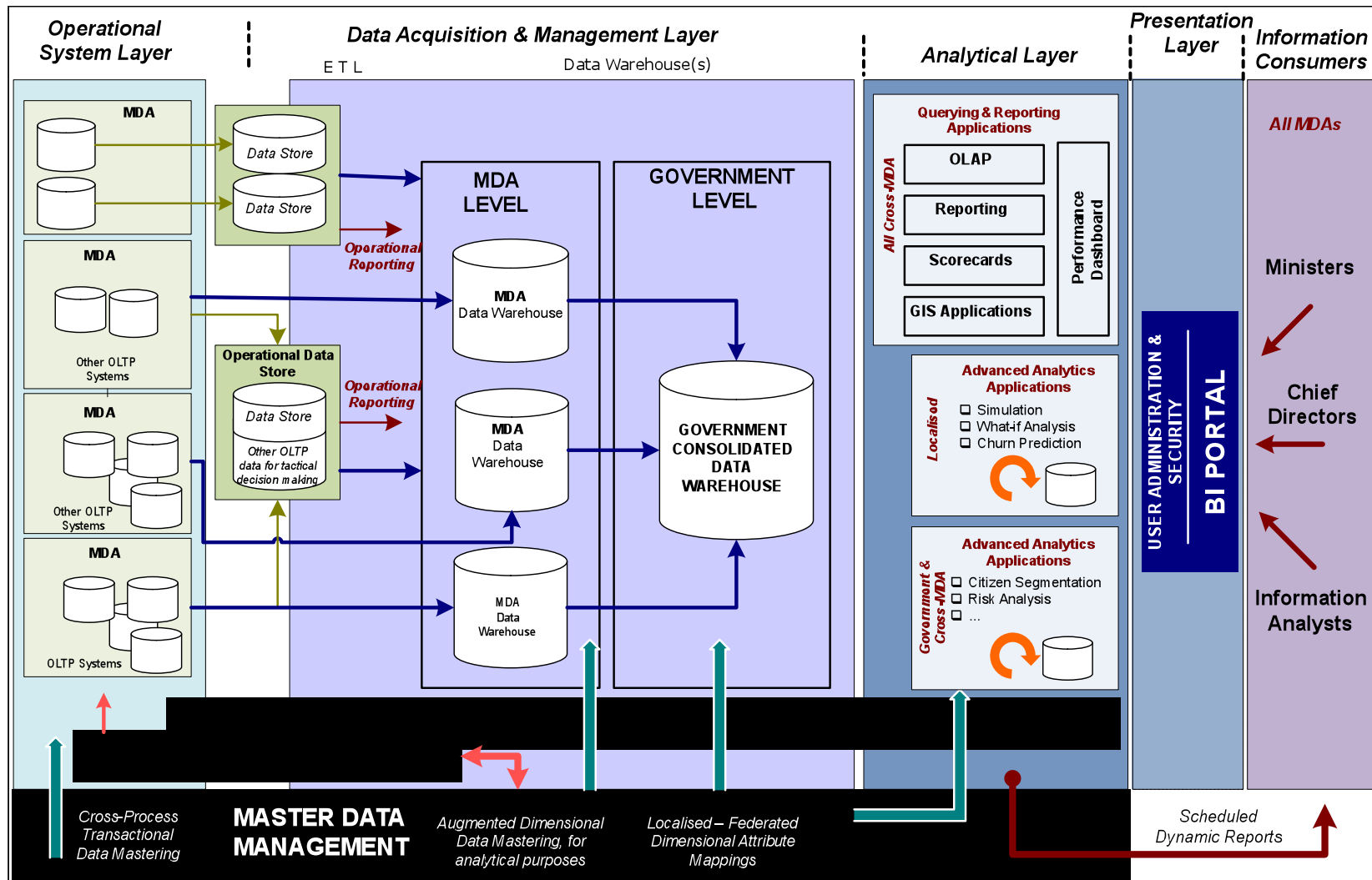
BI Capabilities

- A rules-driven decision engine for making automated and real time decisions.

BI Capabilities

- A batch oriented, historic, detailed and multidimensional data warehousing solution that uses Online Analytic Processing (OLAP) solutions to generate management reports.

BI Architecture



Digital Asset Services

- The Digital Asset Services domain defines the set of capabilities to support the generation, management, and distribution of intellectual capital and electronic media across the MDAs

Digital Asset Services

- **Knowledge Management:** The Government of Ghana has a challenge to define and implement strategies to effectively re-engineer and distribute data, information and knowledge.

Digital Asset Services

- **Knowledge Management:** Information to support decision making may come from various sources including:
 - Structured information : reports and analyses;
 - Unstructured information : Memos, email, web sites;
 - Collaboration and business processes : meetings, seminars, conferences;
 - Experience: review of processes, lessons learned, evaluations;

Digital Asset Services

- **Knowledge Management:** A Knowledge Management solution is therefore required for the following features:
 - Information retrieval - allow access to data and information for use by an organization and its stakeholders;
 - Information mapping /taxonomy - support the creation and maintenance of relationships between data entities, naming standards and categorization;
 - Information sharing - support the use of documents and data in a multi-user environment for use by an organization and its stakeholders;

Digital Asset Services

- **Knowledge Management:** A Knowledge Management solution is therefore required for the following features:
 - Categorization - allow classification of data and information into specific layers or types to support an organization;
 - Knowledge engineering - support the translation of knowledge from an expert into the knowledge base of an expert system;
 - Knowledge capture - facilitate collection of data and information;

Digital Asset Services

- **Knowledge Management:** A Knowledge Management solution is therefore required for the following features:
 - Knowledge distribution and delivery - support the transfer of knowledge to the end customer;
 - Smart documents - support the interaction of information and process (business logic) rules between users of the document. (i.e. the logic and use of the document is embedded within the document itself and is managed within the document parameters).

Digital Asset Services

- **Content Management:** Citizens want and expect timely information, services and programmes accessible online from the Government.

Digital Asset Services

- **Content Management:** Features of the solution will include:
 - Content authoring - allow for the creation of tutorials, CBT courseware, web sites, CD-ROMs and other interactive programmes
 - Content review and Approval - allow for the approval of interactive programmes.

Digital Asset Services

- **Content Management:** Features of the solution will include:
 - Tagging and aggregation - support the identification of specific content within a larger set of content for collection and summarisation;
 - Content publishing and delivery - allow for the propagation of interactive programmes;
 - Syndication management - control and regulate an organisation's brand.

Digital Asset Services

- Records Management
 - effective electronic records management to support information age government will require a formalisation of control over paper based records already existing in the MDAs as well as planning for those that will be generated by new service delivery and policy making systems

Digital Asset Services

- Records Management
 - effective electronic records management to support information age government will require a formalisation of control over paper based records already existing in the MDAs as well as planning for those that will be generated by new service delivery and policy making systems

Digital Asset Services

- Document Management
 - Document management systems are used to track and store electronic documents and images of paper documents.
 - Some of the document management functions overlap with content management systems and records management.

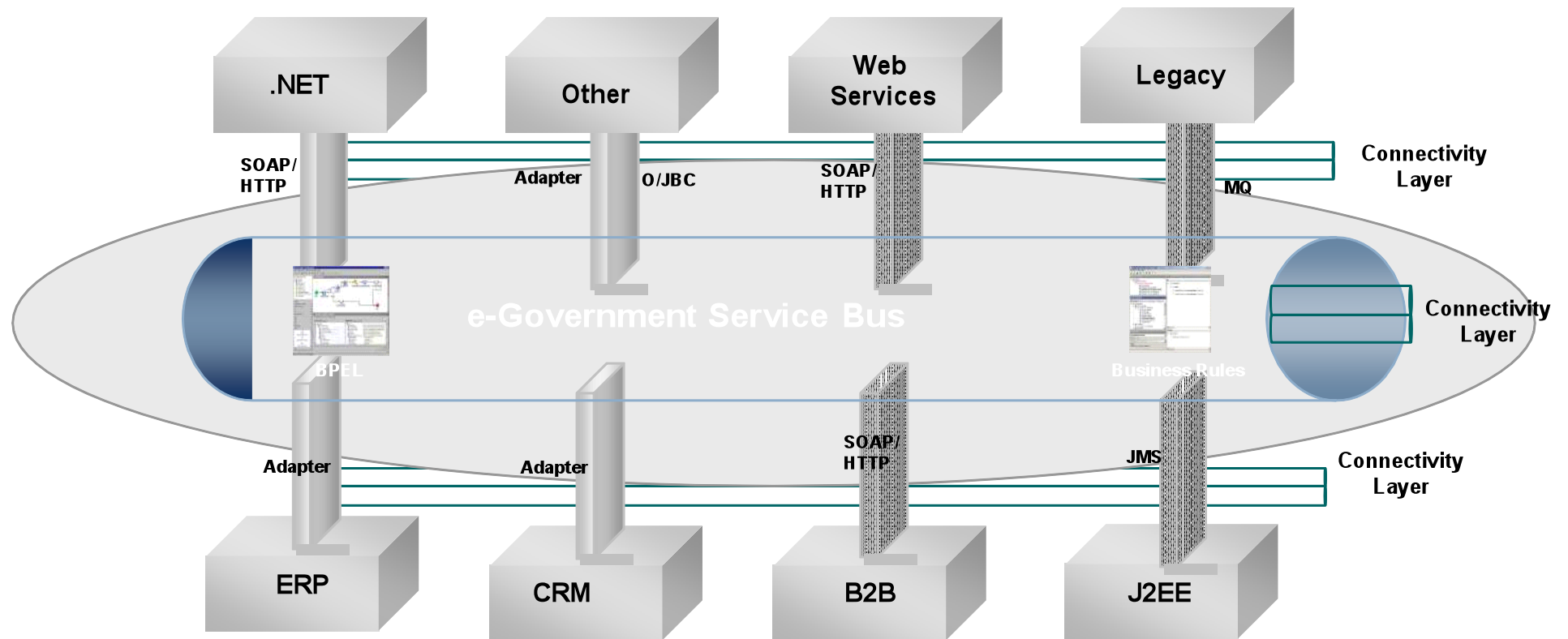
Integration Services

- The integration service architecture will include different integration approaches and an integration hub to orchestrate the integration of application services across government.

Integration Services

- e-Government Service Bus (eGSB)
 - The technology responsible for the movement of data among multiple applications services, both within and outside of the MDA.

Integration Services



Integration Services

- eGSB Connectivity
 - Connectivity is provided through adapter services and Web Services Simple Object Access Protocol (SOAP) invocation services, which provide connectivity with external SOAP clients, such as the Portal, the BPM engine, .Net, Java components etc as well as back end application services.

Adapter Services

- The eGSB must provide bidirectional, real-time data access to various data sources through adapter services, which either listens for, or polls for events in the source application it supports.

Citizen Document Submission

- The eGSB will have a document submission service capability that will be responsible for the receipt of documents and the processing of these documents on behalf of the channel or other peer submission service that initiated the delivery.

Document Transformation

- The eGSB will include a standards based XSLT based transformation of documents from one XML schema to another, thus enabling data interchange among applications using different schemas.

Intelligent Routing

- Data contained within XML messages will be distributed from the source application to a target application using the eGSB's intelligent routing services.

Integration with Back-End Application Services

- The eGSB will provide integration services to back end systems through the use of a variety of different mechanisms such as SOAP, HTTP(S), FTP, SMTP and POP3.

Different Integration Patterns

- The Message Broker Pattern
 - Unlike point to point integration approach the broker can perform transformations on the source system data into the data format expected by the target system.

Different Integration Patterns

- Message Bus Pattern
 - The message bus pattern differs from the Message Broker pattern in that target systems register their interest in the message routing process, and delivery of messages sent to the bus is either by routing (using routing configuration information) or by the implementation of a publish-and-subscribe mechanism.

Different Integration Patterns

- Publish and Subscribe
 - **Publish:** The source system effectively publishes a message to the Message Bus, without requiring any knowledge of the target system.
 - **Subscribe:** Target systems register their interest in various message types by subscribing to receive all messages of that type in the future.

Enterprise Information Integration

- The integration of data from multiple systems into a unified, consistent and accurate representation geared toward the viewing and manipulation of the data.

Data Transfer Techniques

- The data transfer techniques available to the MDAs include:
 - EAI real time transfer
 - EAI propagation of incremental records
 - Incremental Batch Transfer (Changed Data Capture)

Data Transfer Techniques

- Native Replication
- Bulk Refresh Using Batch File Transfer
- Bulk refresh
- ETL Transfer

MDA Application Services

- Food and Agriculture
 - E-Agriculture refers to agricultural services and information delivered or enhanced through the Internet and related technologies

MDA Application Services

- e-Agriculture focuses on the enhancement of agriculture through improved information and communication processes. More specifically, e-Agriculture involves the conceptualisation, design, development, evaluation and application of information and communication technologies (ICT)

MDA Application Services

- Components of the system
 - Crop husbandry;
 - Animal husbandry and feed;
 - Water resources;
 - Seeds, fertilization and pesticide management;
 - Weather monitoring;
 - Packaging practices and methods;
 - Crop pricing;
 - Buyers and seller e-business marketplace.

MDA Application Services

- Correspondence Management
 - A document-centric approach that provides a securely managed, indexed repository of all incoming and outgoing correspondence, and also the base repository by which issues can be tracked; trends analysed and provide data for programme and policy review.

MDA Application Services

- Components of the Correspondence Management
 - Contact Manager;
 - Event calendar;
 - Mailing list;
 - Master document register;
 - Document registration;
 - Archive utility;
 - Scheduler;
 - Message centre;
 - Public grievance management;
 - Public dissemination of key information.

MDA Application Services

- Defence Management
 - The use of a defence management system would offer solutions that would enable the defence agencies in the country to gain efficiency and flexibility within their existing information technology structures.

MDA Application Services

- **Some components of defence systems will include:-**
 - The commander system;
 - The soldier system;
 - The tracking system;
 - Joint intelligence support system;
 - Joint command support system;
 - Coastal Surveillance System;
 - Naval Communication Systems;

MDA Application Services

- Education Management
 - It must take all participating stakeholders into consideration; administrators, teachers, staff, parents, and students through the e-government portal would have access to the functions and information relevant to their needs and interests.

MDA Application Services

- **Some components of the system:**
 - Academic Offerings and Rollover;
 - Academic Rules and Automation Engine;
 - Administration, Standards & Security;
 - Admission Processing;
 - Applications to Enrol and Change of Enrolment;
 - Assessments, Results and Progression;
 - Audit;

MDA Application Services

- Permit Management
 - An e-Permit System provides a simplified online permit application process that is faster, easier to use, and more secure.

MDA Application Services

- **Components of the system will include:**
 - Permit status; module
 - Decision tree;
 - Account Management;
 - Work collaboration;
 - Management reporting;
 - Permit application fee management.

MDA Application Services

- Planning and Budgeting
 - The use of the planning and budgeting application software would provide a connected and streamlined budgeting, planning, forecasting, reporting and analysis as well as control over the accuracy, completeness, and timeliness of the planning and budgeting process while ensuring that the agency's strategies are reflected in the financial plans.

MDA Application Services

- **Some modules that make up the system will include:**
 - Accounts receivable;
 - Accounts payable;
 - Payroll;
 - Budgeting, planning and forecasting;
 - General ledger;
 - Report writer;
 - Cash management;

MDA Application Services

- Health Management
 - The health care management solution will be based on advanced and innovative technologies to achieve a more efficient healthcare system with the ultimate goal of protecting the citizens' health or facilitating access to healthcare services

MDA Application Services

- **Some components of the Healthcare Management system will include:**
 - Patient details;
 - Visit calendar;
 - Clinical charting;
 - Electronic medical billing;
 - Document manage;
 - Authorisation and drug regiment;

MDA Application Services

- Judicial Management
 - The judicial Management system is made up of a number of components:-
 - **Judicial Enforcement Management System**
 - **Jury Management System**
 - **Prosecuting Management System**
 - **Court Management System**
 - **Jail Management System**

Judicial Management

- Judicial Enforcement Management System
 - It provides the following functions: - payments, warrants, sentencing, docket scheduling, generating forms and reports. The court initiates and maintains any number of court cases with the court management system component of the system.

Judicial Management

- Jury Management System
 - The Jury Management System software offers a complete jury management solution, including random juror selection, document generation, history tracking and check generation. From initial juror panel selection through final juror pay processing, this software for is for all jury management tasks.

Judicial Management

- Prosecuting Management Systems
 - Prosecuting Attorney System delivers complete functionality for prosecuting attorney offices, including detailed case party information and unlimited custom notices and reports generation. This system enables the prosecuting attorney to perform case management tasks efficiently and accurately, resulting in increased productivity.

Judicial Management

- Court Management System
 - Court management system is a collaborative process of assessment, planning, facilitation and advocacy for options and services to meet legal needs through communication and available resources to promote quality, cost effective outcomes.

Judicial Management

- Jail Management System
 - It provides details about offenders stay at jail from booking to release. Jail data collection provides for tracking of the following:-
 - Multiple charges;
 - Booking information;
 - Rebook information;
 - Beginning dates, expected release and sentence end dates;
 - Prisoner accounting (for purchases and deposits);
 - Jail activities (medication, court dates, etc.);
 - Inmate housing movements;
 - Electronic fingerprint and mug shots.

MDA Application Services

- Law Enforcement
 - Technology is an essential tool to criminal justice and law enforcement agencies. The faster and more effectively it works, the safer our streets and communities. The more cost effectively it can work; the more officers, investigators, and agents can be used to fight crime - not paperwork.

MDA Application Services

- **Some components of the system will include:**
 - Calls for service;
 - Offence reporting;
 - Involved parties;
 - Involved victims;
 - Property;
 - Evidence;
 - Vehicle;
 - Personnel management;
 - Field contact;

MDA Application Services

- Public Utility
 - The use of a utility management system would streamline and simplify the management of public utilities while improving the quality of customer data and enhancing the timeliness of service and response to customers.

MDA Application Services

- **Some components of the system will include:**
 - Customer database;
 - Customer management;
 - Work order management;
 - Online payment processing;
 - Collections management;
 - Penalty/cut-off processing;
 - Billing history;
 - Metered and non-metered billing.

MDA Application Services

- Regulatory Compliance
 - The use of a compliance management system would help execute a regulatory process by ensuring that rules and laws are complied with.

MDA Application Services

- **Components that make up the Compliance Management System:**
 - Inspections and prosecution module;
 - Penalties module;
 - Clearance certificate module;
 - Billing module.

MDA Application Services

- Social Services
 - A social services system is designed and built to evaluative case management applications for organisations working with children and young people and their families, through the provision of tailor-made products and services that reflect best practices, and also ensure that each division receives a system customised to meet their individual practice and performance requirements.

MDA Application Services

- **Some components Modules that make up the system**
 - Forms processing;
 - Document index;
 - Remote capture;
 - Invoice process;
 - Claims processing;

MDA Application Services

- Transport Management
 - Transportation management helps you calculate and settle freight costs based on actual shipments and current freight rates and use this information to verify invoices sent from carriers or from self-billing transportation service providers.

MDA Application Services

- **Modules for Transport Management System**
 - Customer service and transportation collaboration portal;
 - Carrier and user notification module;
 - Automated bid management system;
 - Load and truck posting service;
 - Fuel surcharge management;
 - Accounting and accrual functions management;
 - Freight bill auditing and payments system;
 - Comprehensive user technical support.

MDA Application Services

- Tourism
 - The Ministry of Tourism exists to ensure the development and promotion of tourism with the aim of optimising the socio-economic growth and positive environmental impact for the benefit of communities and the country at large.

MDA Application Services

- **Components of the system will include:**
 - A destination management system;
 - A database of arrival and departure statistics and annual economic indicators;
 - Database of tourism facilities, accommodations, attractions, destination information etc.;
 - Database of source market information and marketing intelligence;
 - Backend database system to support the development and management of national marketing and promotion for tourist sites.

MDA Application Services

- Post
 - Mail, or post, is a method for transmitting information and tangible objects, wherein written documents, typically enclosed in envelopes, and also small packages, are delivered to destinations around the world.

MDA Application Services

- **Components of the system will include:**
 - Data warehouse for the capture and presentation of quality data within the letters business.
Generation of reports to ensure quality and to the regulator;
 - Logistics management;
 - Call Centre telephony application used for call centres.

MDA Application Services

- Virtual Consulate System
 - A virtual consulate system is an online application which will allows visa applications to be submitted online, verified online, approved and issued after a certain period of time.

MDA Application Services

- **Components of the system will include:**
 - Passport application module;
 - Electronic Visa (e-visa) application module;
 - Notification of Visa status module;
 - Knowledge base.

MDA Application Services

- Electoral System
 - One feature of the system will include:
 - Secured and monitored online voter registration system: This gives citizens the opportunity to register online from any location where there is internet connection as long as they meet the requirements stipulated by the electoral commission;

MDA Application Services

- **Components of the system will include:**
 - Online registration module;
 - Intelligence reports module.

MDA Application Services

- Local Government
 - One features of the system:
 - Ability of modules such as accounting and tax assessment system to integrate with other systems from other revenue agencies i.e. VAT, IRS to enable holistic views in making national decisions.

MDA Application Services

- Components of the system include:
 - Accounting: This module will serve the purpose of a normal accounting package which will keep track of all tax received.
 - Tax Assessment: This module will allow for a seamless integration with other modules such as the accounting module to prevent the re-entering of data causing duplication of entry and effort. The tax assessment module will also generate intelligent business reports on rates and tolls collection which will aide the assembly in decision making.

Shared Enterprise Application Services

- Shared Enterprise Resource Planning (ERP) Services
 - An ERP Shared Service Centre (SSC) must be built based on an industry leading ERP solution to support the MDAs back office functions such as those currently operated and managed by OHCS.

Shared Enterprise Application Services

- Shared GIS Solution
 - GIS as a shared service can be integrated into any of the Ghanaian MDA's enterprise information system to help answer questions and solve problems by looking at data in a way that is quickly understood and easily shared.

Shared Enterprise Application Services

- Typical Areas for GIS Application
 - Fire/Emergency Medical Services/Disaster
 - Law Enforcement
 - Education
 - Health
 - National Security
 - Elections
 - Electricity
 - Libraries and Museums

Shared Enterprise Application Services

- E-Procurement
 - E-Procurement is the term used to describe electronic methods of conducting business transactions. The 'e' in e-procurement stands for electronic. E-Procurement can be used in every stage of the process. It can begin with the actual sale coming through to the purchaser and end with the customer's invoice and payment.

Shared Enterprise Application Services

- Government e-Marketplace
 - E-Marketplaces are highly efficient, collaborative hubs that organise complex business processes between multiple internal and external participants into a virtual commerce community.

Shared Enterprise Application Services

- E-Tendering
 - Electronic Tendering is carrying out the traditional tendering process in an electronic form, using the internet.

Shared Enterprise Application Services

- Using E-Tendering the Public Procurement Authority can:
 - Raise Indents as per the requirement;
 - Approve indents online;
 - Create and publish tender;
 - Sell tenders;
 - Receive bids;
 - Evaluate tenders;
 - Approve tender;
 - Award contract.

Shared Enterprise Application Services

- Using E-Tendering, the suppliers can:
 - Receive notification of the relevant tenders;
 - Purchase tenders document;
 - Submit bids online;
 - Track the status of their bids.

Shared Enterprise Application Services

- Integration of Systems
 - A starting point in any integration strategy must be to scrutinise existing discrepancies and examine the scope to refine and streamline processes in order to reduce unnecessary administration.
 - Integrating the technical infrastructure is only part of the integration challenge. The disparate businesses processes in operation must also be reconciled.

Shared Enterprise Application Services

- Critical Success Factors
 - A successful eprocurement implementation therefore needs commitment at the highest level, supported by clear and regular communication and training of users in the new systems.

Shared Enterprise Application Services

- Security
 - The security features incorporated in the application ensures that all activities are logged, no unauthorised person has access to data, all sensitive data is encrypted and system can be restore in a minimal possible time in case of a disaster or system crash.

Shared Enterprise Application Services

- Some typical features of the system include:
 - Secure electronic communication- allowing buyer to post invitation to tender (ITT) and supplier to post tender;
 - User interface with a list of current tenders;
 - Controlled access to tenders using passwords, user profiles and permissions;
 - Central storage of documentation;
 - Repository of previous ITTs;
 - Repository of standard terms and conditions;

Shared Enterprise Application Services

- Benefits of the System
 - The e-procurement system has numerous benefits but most important of these are the benefits the system offers to buyers and suppliers.

Shared Enterprise Application Services

- Benefits to Buyers
 - Reduced tender cycle-time;
 - Fast and accurate pre-qualification and evaluation, which enables the automatic rejection of suppliers that fail to meet the tender specification;
 - Faster response to questions and points of clarification during the tender period;
 - Reduction in the labour intensive tasks of receipt, recording and distribution of tender submissions;

Shared Enterprise Application Services

- Benefits to Buyers
 - Reduction of the paper trail on tendering exercises, reducing costs to both departments and suppliers;
 - Improved audit trail increasing integrity and transparency of the tendering process;
 - Improved quality of tender specification and supplier response;
 - Provision of quality management information.

Module 5

DATA ARCHITECTURE REFERENCE MODEL

- The Data Architecture Reference Model (DARM) is a flexible and standards-based framework to enable information sharing and reuse across the Government via the standard description and discovery of common data and the promotion of uniform data management practices. The DARM provides a standard means by which data may be described, categorised, and shared

DARM Principles

- **Principle 1: Data is an Asset**
 - Data is an asset that has value to Government and is managed accordingly.

DARM Principles

- **Principle 2 : Data is Shared**
 - Users have access to the data necessary to perform their duties; therefore, data is shared across Government functions and organisations.

DARM Principles

- **Principle 3: Data is Accessible**
 - Data is accessible for users to perform their functions

DARM Principles

- **Principle 4: Data Trustee**
- Each data element has a trustee accountable for data quality.

DARM Principles

- **Principle 5: Common Vocabulary and Data Definitions**
- Data is defined consistently throughout the Enterprise, and the definitions are understandable and available to all users.

DARM Principles

- **Principle 6: Data Security**
- Data is protected from unauthorised use and disclosure.

The DARM Approach

- The Data Architecture Reference Model (DARM) describes the main entities that the Government is involved with, and on which data is stored in government systems or archives, and the main properties, or data items, stored for each entity.

The DARM Approach

- It is also desirable that common entities and entity attributes, shared across different MDAs, will be recorded and represented in a uniform manner, across the GoG

The DARM Approach

- Another important role of the DARM is to provide the data context, which to explain how the different data entities fit in within the larger picture of the GGEA.

The Main Government DARM

- A government is involved in many activities which are similar, or even identical, to those performed by any large organisation.

The Main Government DARM

- Human Resources
 - A government recruits and manages employees, and the data entities related to this activity are grouped into the Human Resources (HR) group.

The Main Government DARM

- Facilities
 - A government manages many physical facilities, such as government buildings, and the data entities related to those activities are grouped into the facilities group.

The Main Government DARM

- JDG
 - There are some aspects, or processes, which are unique to government. One of them is maintaining law and order, and the core data entities related to law enforcement and the judicial system are described in the JDG group.

The Main Government DARM

- GIS
 - The management of geographic, or location related entities and processes such as natural resources, land titles and a national mapping service is another important task carried out by government, and the entities related to this task are described in the GIS group.

The Main Government DARM

- Legislation
 - Legislation is another process unique to government and the data entities involved are described in the legislation group.

The Main Government DARM

- Entity
 - An entity is any real world 'thing' that we want to keep data on. A person, an organisation, a criminal law case, a budget appropriation, a facility, and a tract of land are all entities.

The Main Government DARM

- Person Entity
 - The first core level entity on which the DARM is based is the person entity.
 - The core assumption underlying the person entity (and actually, much of the DARM), is that each person residing in Ghana would have one, unique, numerical identifier across all government agencies.

The Main Government DARM

- The Organisation Entity
 - The second core entity on which the DARM is based is the organisation.
 - An organisation is an administrative structure with a mission. An organisation also usually has an independent legal standing and may act as a legal party in court proceedings.

The Main Government DARM

- Companies
 - We assume that the master data store for company data will be the Registrar General.
 - We also assume the Registrar General will maintain a unique, numerical identifier, for each company or foundation registered with it.

The Main Government DARM

- Foundations
 - Foundations are non for profit organizations, also often known as Non Government Organizations (NGO's).
 - We assume that the Registrar General will also maintain the master data store for foundations and will maintain a unique, numerical identifier for each foundation registered with it.

The Main Government DARM

- MDA
 - MDA (Ministry Department Agency) is a permanent or semi-permanent organisation in the machinery of government that is responsible for the oversight and administration of specific functions, such as an intelligence agency, government ministry, revenue agency, GHS.

The Main Government DARM

- The HR Entities
 - Essentially, a government carries out its tasks by recruiting and employing employees, and by procuring equipment and services.

The Main Government DARM

- Position and Employee
 - The two main entities in the HR are position and employee.
 - A position is a specific job instance requiring an established set of duties and competencies.
 - An employee is A PERSON who has an agreement with an ORGANIZATION to perform duties and engage in activities on behalf of the ORGANIZATION and for specific compensation.
 - An employee fulfils a position.

The Main Government DARM

- Position
 - The aim is to maintain a central data store for government positions, and specifically for vacancies (A vacancy is simply a position which has to be fulfilled).
 - Maintaining such a central data store would enable more efficient recruitment and HR processes.

The Main Government DARM

- Employee
 - An employee is first and foremost a person, and thus the core personal details for each employee, such as his name, Date of Birth, National ID number and current address will be derived from the National Registry population master data store.

The Main Government DARM

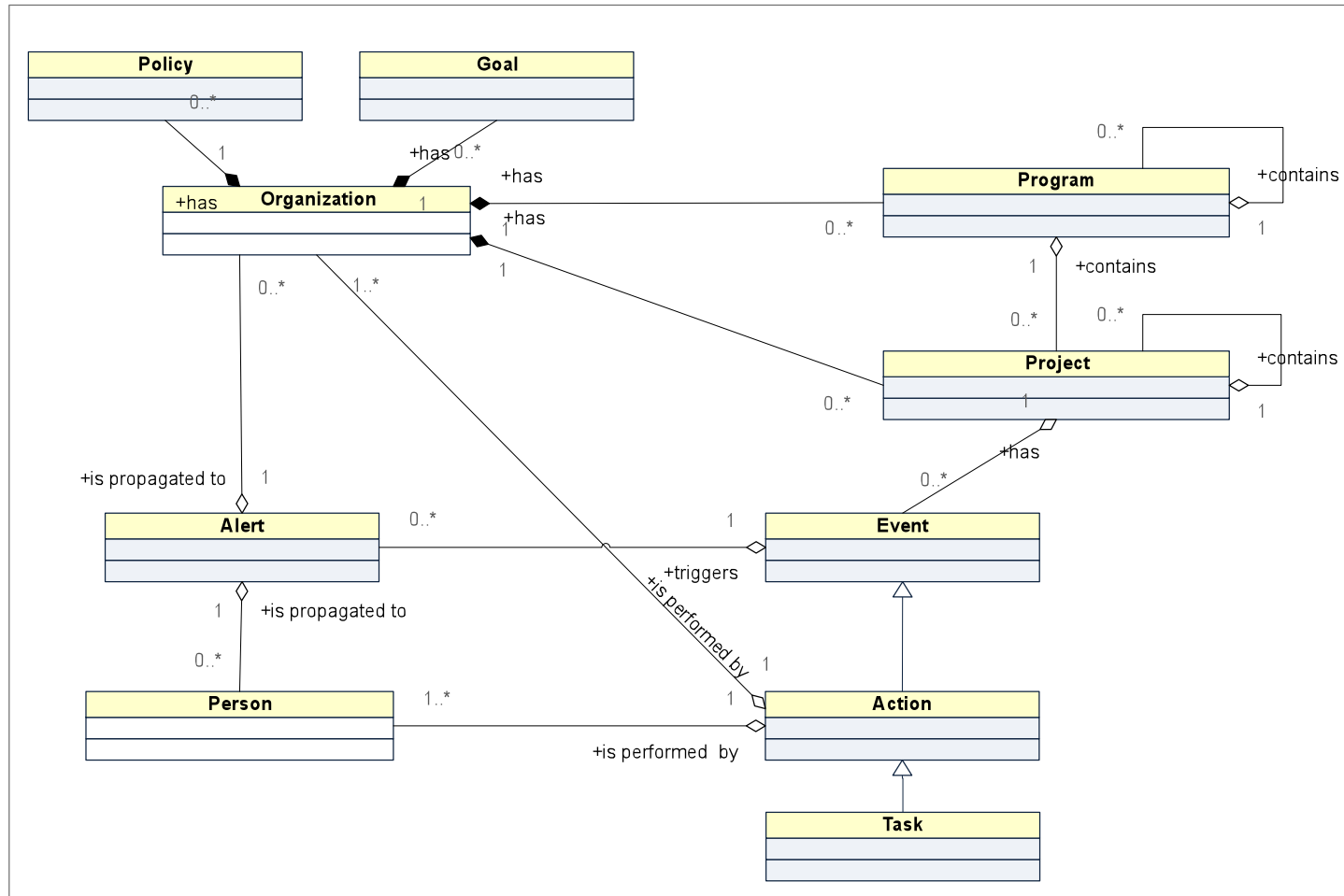
- The Procurement Group
 - An organisation interested in procuring goods or services publishes an RFP. An RFP should be associated with a program, a project, and specific goals. In response to it different suppliers submit proposals.
 - Once a supplier is selected, a fee is agreed upon and a contract is signed. The supplier provides the goods or services, and then submits an invoice. The organisation then pays for the goods or services provided.

The Main Government DARM

- The CRM Group
 - Services are provided to citizens in response to a request, which may be explicit or implicit. The three way relationship customer – MDA – service is the core relationship on which the CRM part of the DARM is structured.

The Main Government DARM

- The Project Management Group



Project Management Relationships

The Main Government DARM

- The Documents Group
 - In general, we view records as any information recorded in any form, while documents refer mainly to textual documents which are relied upon as the basis, proof or support for something.

The Main Government DARM

- The GeoSpatial Group
 - A GeoSpatial feature is anything in the world that has a location (i.e., point, line, and polygon/area features).

The Main Government DARM

- The Facilities Group
 - A facility is any structure or area (such as a building, a playfield, or even a natural lake), that has a specific use.
 - Facilities are served by utilities – most facilities are connected to the water, electricity and sewage networks.
 - The relationship, or connection, between a facility and a utility network is uniquely identified through a utility contract number.

The Main Government DARM

- The Budget Group
 - Like all organizations, a government maintains a budget.

The Main Government DARM

- The Law and Order Group
 - An incident is a situation that required the response of emergency personnel and organisations and results in the recording of information about this situation.
 - An incident may be a traffic accident, a violent argument, an emergency ambulance call, fire, theft or robbery.

Module 6

TECHNICAL ARCHITECTURE REFERENCE MODEL

- The Technical Architecture Reference Model (TARM) is a technical framework categorising the standards and technologies for the technical infrastructure to support the secure delivery of services.
- It also defines the technical specifications of products, protocols, etc that support the different layers of infrastructure.

TARM Principles

- **Principle 1: Business Continuity**
 - Enterprise operations are maintained in spite of system interruptions.

TARM Principles

- **Principle 2: Requirements Based Change**
 - Only in response to business needs are changes to applications and technology made.

TARM Principles

- **Principle 2: Responsive Change Management**
 - Changes to Government technical infrastructure environment are implemented in a timely manner.

TARM Principles

- **Principle 3: Control Technical Diversity**
 - Technological diversity is controlled to minimise the cost of maintaining expertise in and connectivity between multiple processing environments.

TARM Principles

- **Principle 4: Interoperability**
 - Software and hardware should conform to defined standards that promote interoperability for data, applications and technology.

TARM Principles

- **Principle 5: Robust and Reliable Network Infrastructure**
 - Networks must be 100% available (i.e. 24x7x365) to enable access to critical government services all the time.

TARM Principles

- **Principle 6: Open Architecture Support**
 - The technical infrastructure must be designed to accommodate open, vendor-neutral, mainstream technologies and multi-protocol communication.

TARM Principles

- **Principle 7: Secure Access**
 - Network access must be designed as a function of authentication and authorization, not of location.

TARM Principles

- **Principle 8: Ensuring Confidentiality**
 - Networks must be designed with standards that ensure confidentiality and security of data as a high priority.

TARM Principles

- **Principle 9: Support for Converged Services**
 - Networks should be designed to support converged services while accommodating traditional data, voice, and video services and to be “application aware” in the delivery of business-critical application systems.

TARM Principles

- **Principle 10: Support for Converged Services**
 - Networks should be designed to support network-neutral applications.

TARM Principles

- **Principle 11: Shared Service Managed Centrally**
 - Utilise the centrally maintained and managed enterprise-wide network infrastructure.

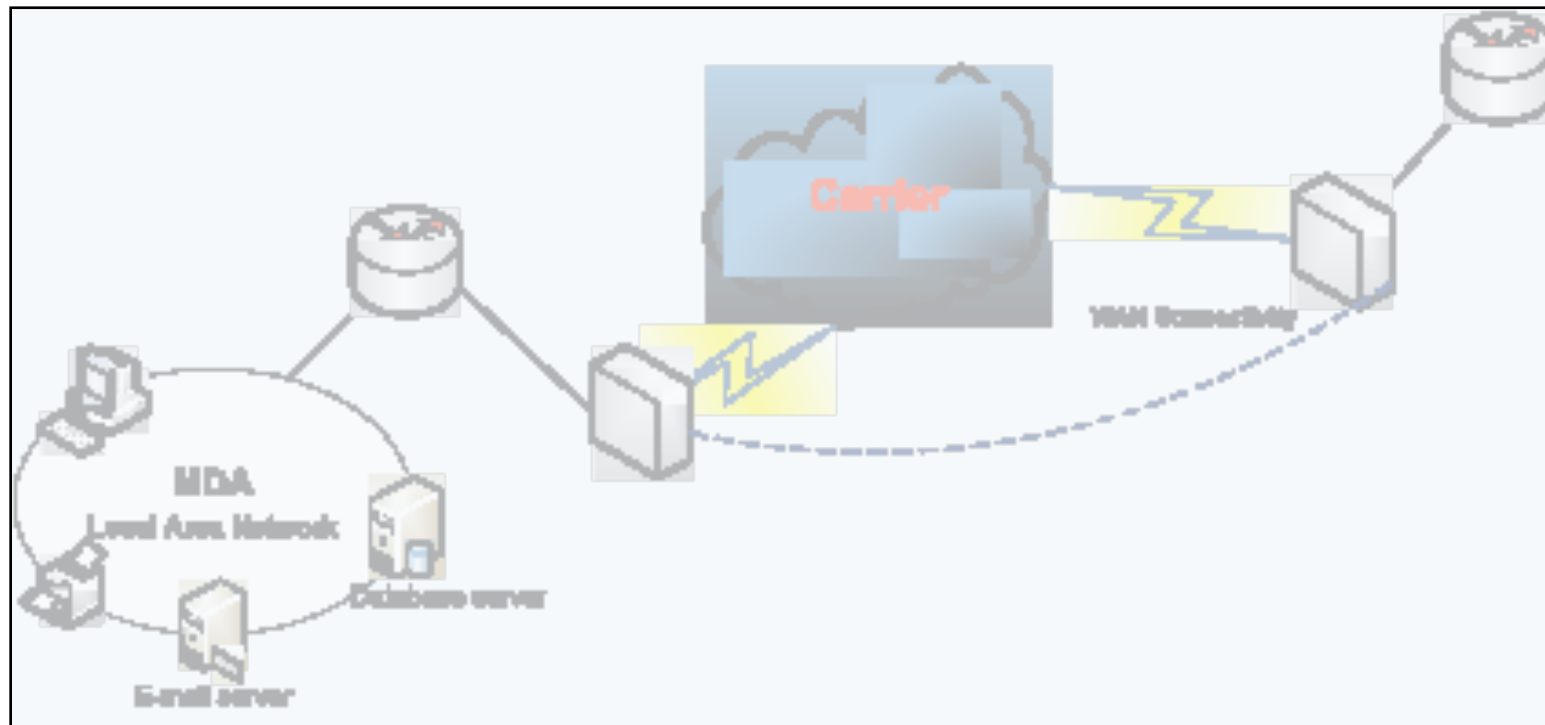
The TARM

- The TARM is the foundation upon which the Government can effectively deliver mission-critical services to its citizens.

Government Wide Area Network

- Wide Area Network (WAN) is the technical infrastructure that will join Government agencies Local Area Networks (LANs) and citizens through WAN devices and technologies.

Typical Network Topology



The GovNet Design Requirements

- The GoG should look for suppliers who are positioned to deliver the right mix of services on a national basis, both in terms of breadth and depth

The GovNet Design Requirements

- The WAN solution should be based on carrier-class equipment and should use VPN technology to create secure networks via the combination of meshed VPN tunnels to form a single routing context.

Benefits of GovNet to the GOG

- Increased reliability and security;
- Increased levels of standardisation and performance to improve the overall consistency of services delivered to the entire organisation;
- Rapid transition and transformation to deliver cost and service benefits as quickly as possible.

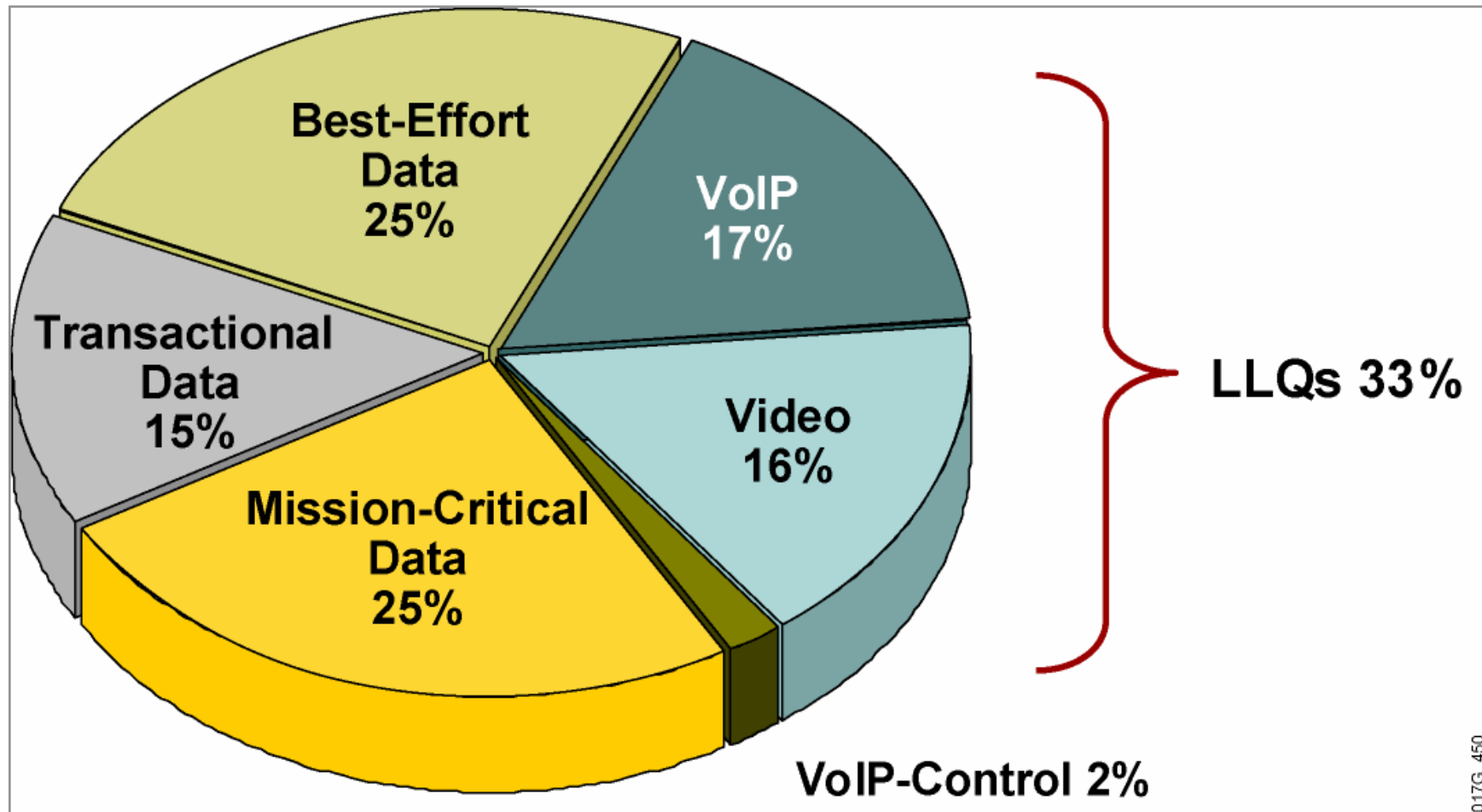
The National Backbone

- The national backbone would interconnect networks from each of the MDAs to form a coherent, national network. Some of the benefits of this approach are:
 - Allows GoG to chose single national backbone network provider;
 - Using IP address summary approach will ensure less routing and therefore less overhead on national network.

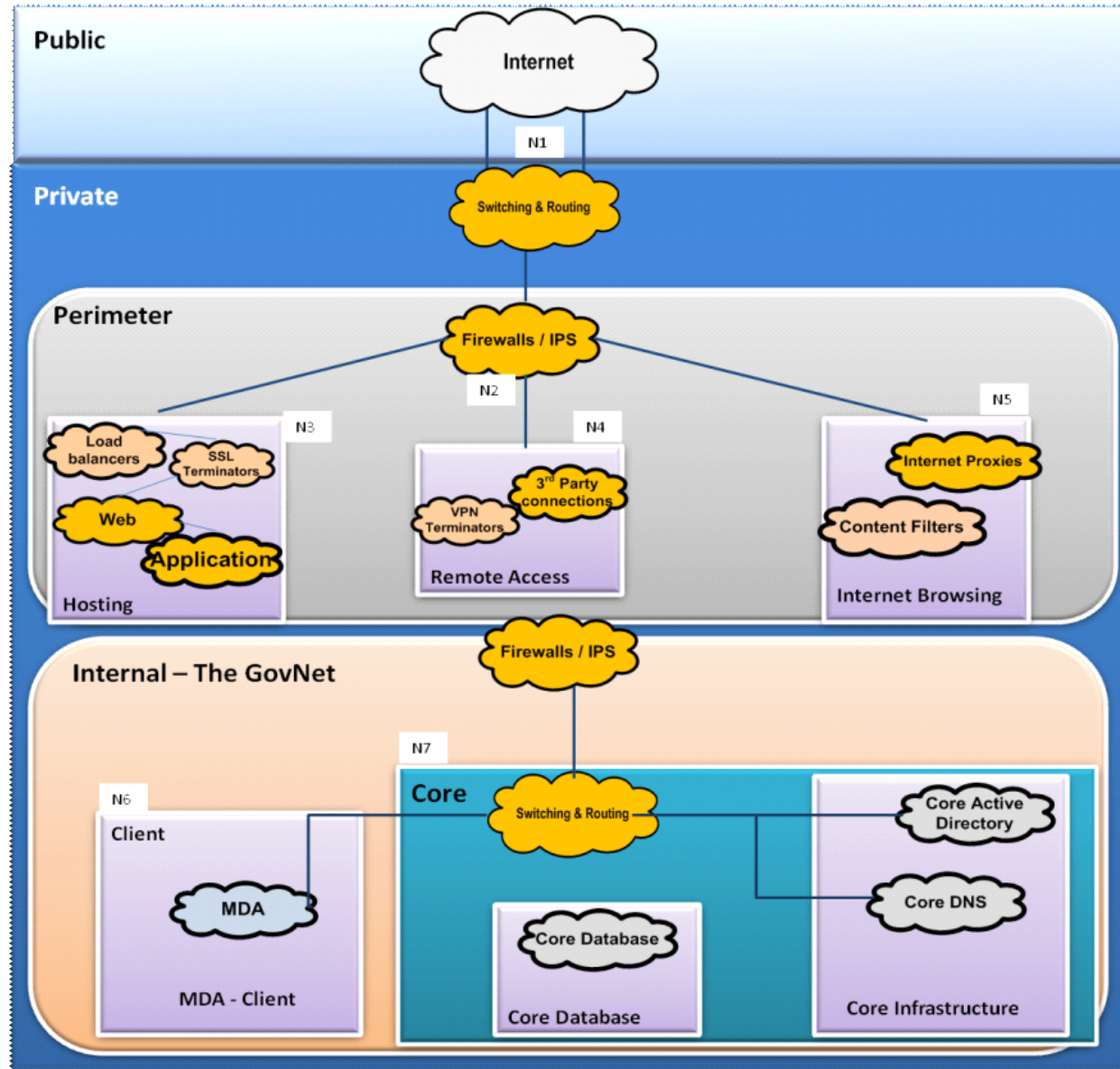
Multi Protocol Label Switching

- MPLS is recommended as the WAN protocol as it delivers the following benefits:
 - MPLS can create “any-to-any” VPN without a full mesh of PVCs (Permanent Virtual Circuit)
 - With MPLS achieving “Fully-Meshed” VPNs are simpler than many hub-and-spoke configurations
 - Supports voice and video by applying QoS to time sensitive packets
 - Switches traffic more rapidly than traditional routing protocols
 - Secure communication
 - Logically separates VPN traffic
 - Connectivity is flexible and uncomplicated.

Industry Standard Bandwidth Allocation Standards



Key Components of GovNet



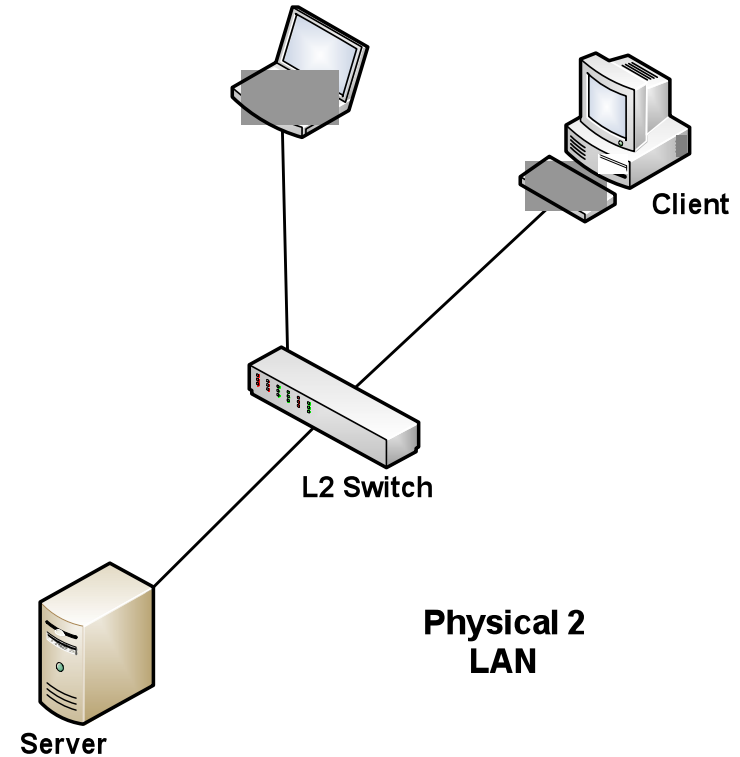
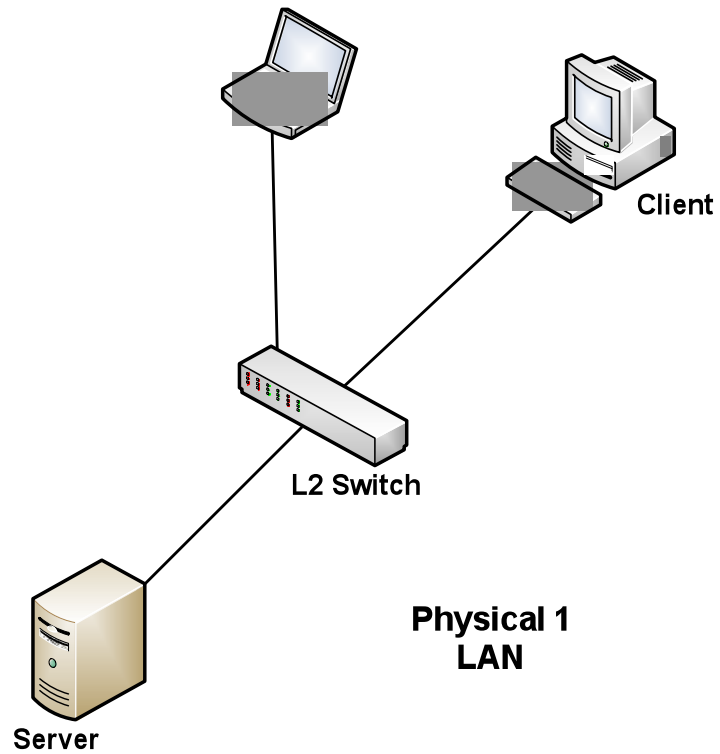
Features of the Architecture

- N1 – The Public Internet;
- N2 – Firewalls & Intrusion Prevention Systems (IPS);
- N3 – The Internet Hosting Module.

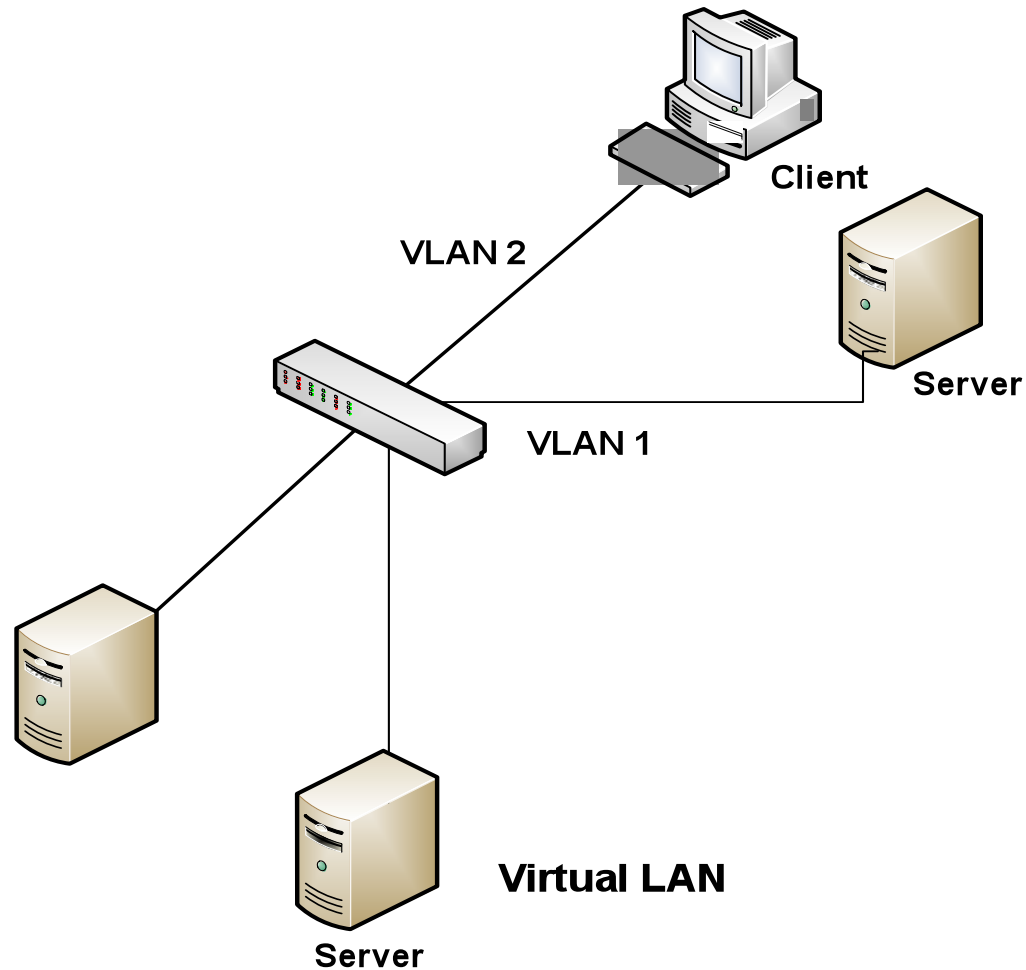
LOCAL AREA NETWORK (LAN)

- A network segment is usually referred to the connection of two or more devices in the Layer 2 (L2) of the Open System Interconnection (OSI).
- A LAN is said to consist of communications systems of multiple interconnected workstations, peripherals, data terminals, or other devices confined to a limited geographic area consisting of a single building or a small cluster of buildings.

Physical LAN on L2 Switches



Virtual LAN Segments on L2 Switches



LAN Recommendations

- It is recommended that MDAs undertake a LAN refresh programme.
- This should be a formally architected infrastructure and planned with consideration of changes elsewhere in the environment.

LAN Architectures

Site definition	Scale (clients)	Architecture	Other
Small	0-50	Distribution and access (Layer 2)	Single VLAN; WAN Router if required
Medium	50-200	Core (Layer 3) Distribution and access (Layer 2)	Single/Multiple VLAN depend upon exact no of users
Large	200+	Core (Layer 3) Distribution (Layer 2) Access layers (Layer 2)	Multiple VLANs; Zones (building or collection of buildings) with each zone connecting to core via Layer 3
Data Centre		Core (Layer 3) Distribution (Layer 2) Access layers (Layer 2)	Multiple VLAN (production, backup, management, DMZ, WAN); Zones (various servers) with each zone connecting to core via Layer 3

Structured Cabling Systems

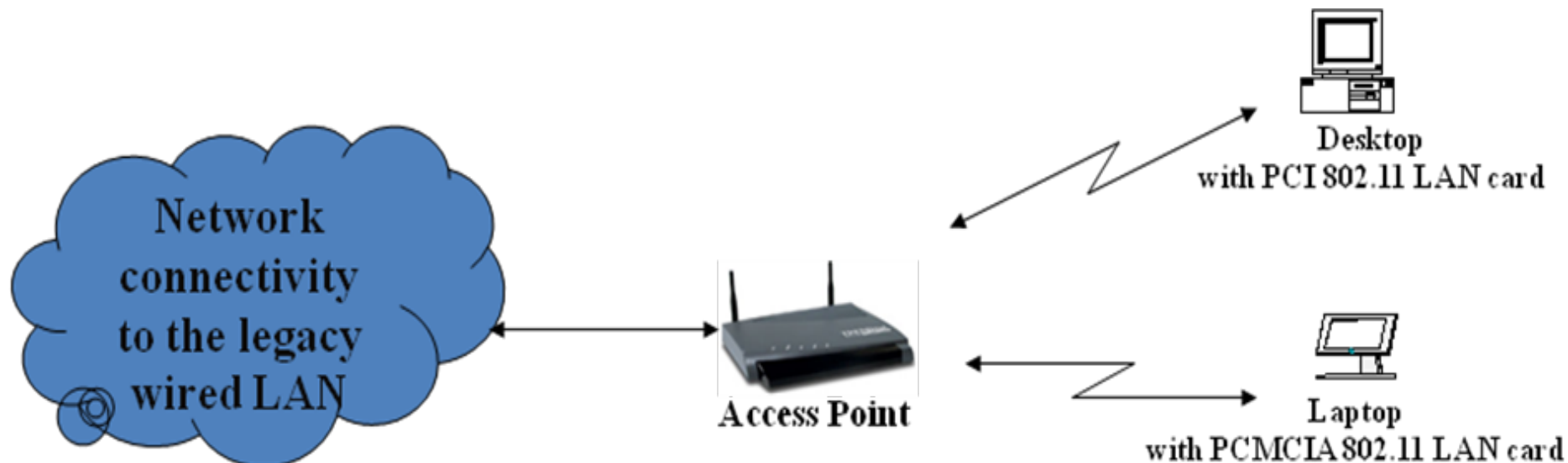
- Cabling installations for new buildings, major cable plant additions or modifications, building renovations or remodeling, shall meet all minimum requirements and mandatory criteria addressed in Telecommunications Industry Association/Electronic Industries Association (TIA/EIA) Commercial Building Telecommunications Standards 568, 569, 606, 607, and applicable electrical codes.

Copper Network Cabling

- Structured Cabling System installations for new and/or renovated buildings without cabling shall be Category 6 Unshielded Twisted Pair (UTP) as specified by TIA/EIA 568-B.2.1 Commercial Building Telecommunications Cabling Standards.

Wireless Local Area Network (WLAN)

- The design of a wireless LANs should primarily ensure security, convenience, cost efficiency, and ease of integration with other networks and network components.



The IEEE 802.11 Wireless LAN Architecture

- The 802.11 architecture is comprised of several components and services that interact to provide station mobility transparent to the higher layers of the network stack.
 - Wireless LAN Station
 - Basic Service Set (BSS)

Wireless LAN Recommendations

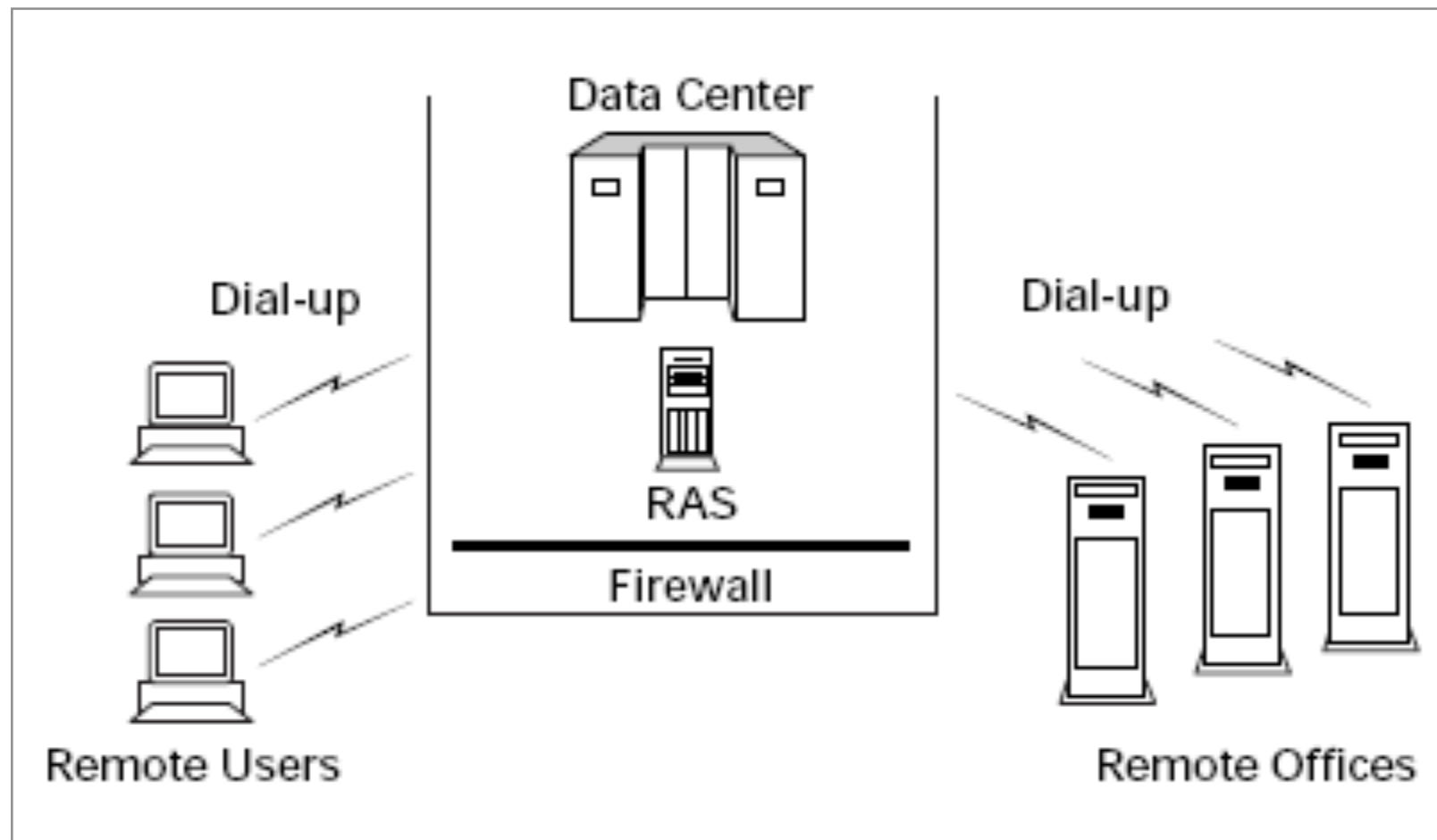
- Implement a layered approach to wireless security;
- Develop a shared key distribution process prior to implementation;
- SNMP must be disabled on wireless networking and communications devices unless explicitly required.

General Wireless Standards Consideration

- Wireless Standards include:
 - The IEEE 802.11x standards form a family of specifications that define how WLAN equipment should be produced so equipment from different manufacturers can work together.
 - The IEEE 802.11b and .11g standards operate in the unlicensed radio 2.4 GHz frequency band and provide up to 11 Mbps and 54 Mbps transmission speeds, respectively, for wireless connectivity.
 - The IEEE 802.11g is backwards compatible with .11b allowing .11g and .11b devices to coexist in the same network (.11g devices' performance declines based on distance and number of wireless devices).

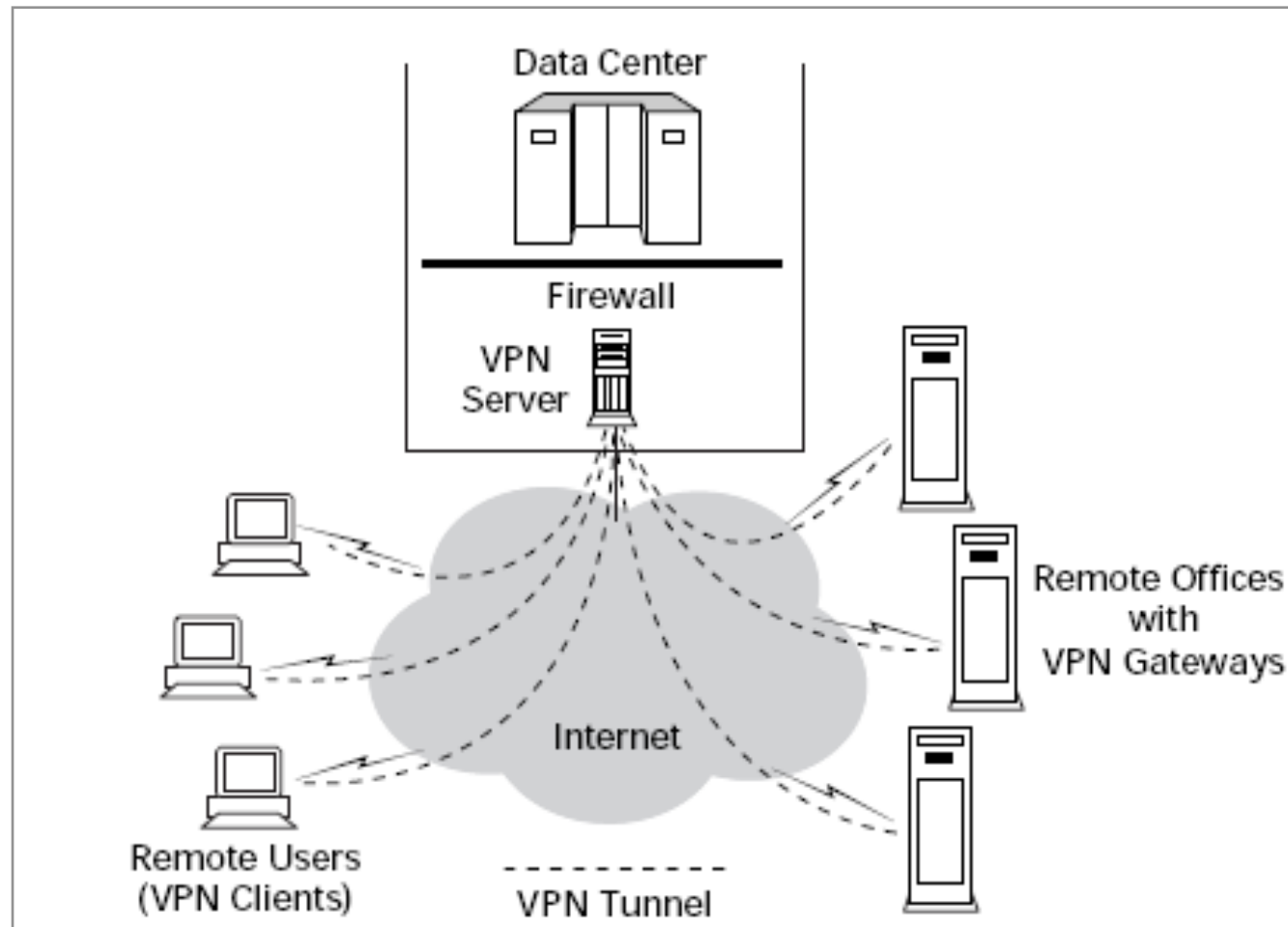
Remote Access

- Use a Remote Access Server (RAS)



Remote Access

- With a VPN (Virtual Private Network)



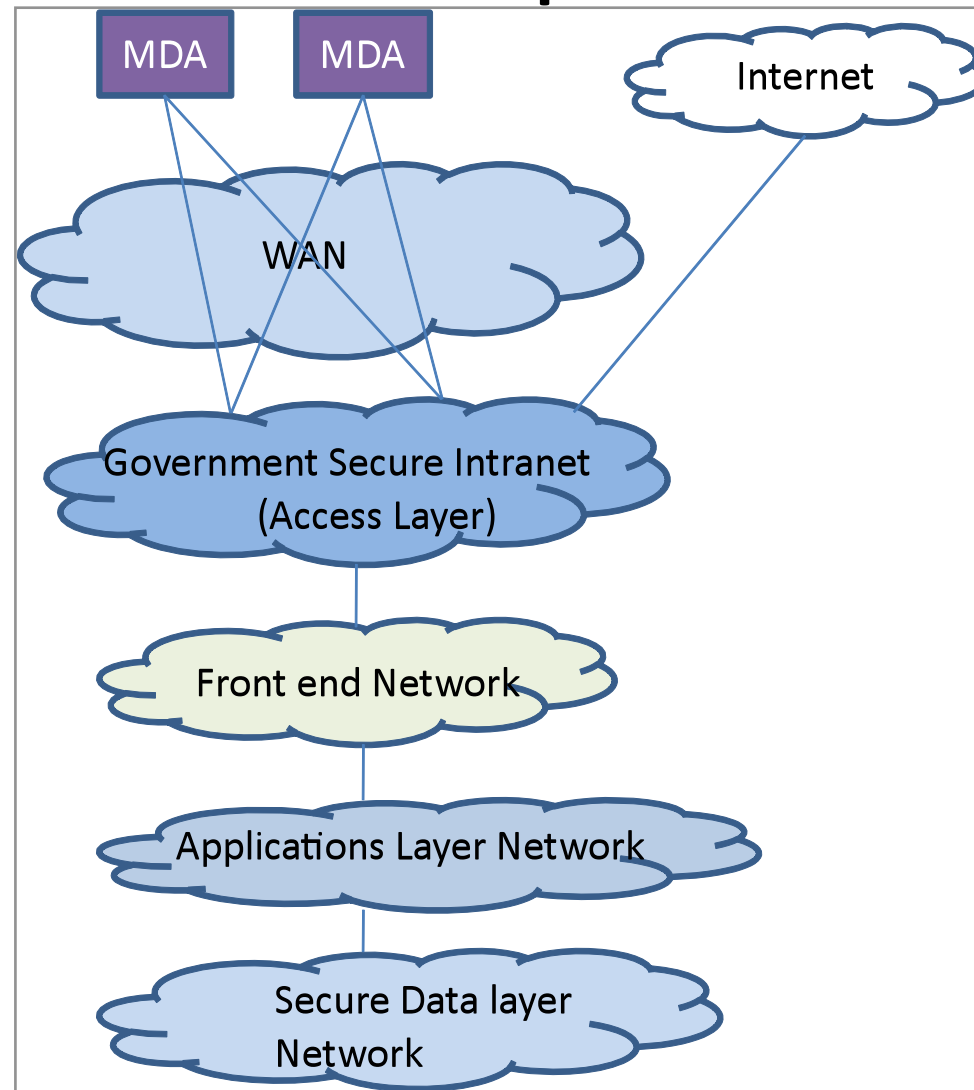
VPN Benefits

- Elimination of the RAS, of associated modems, and of technical support costs to install, configure, and maintain the RAS.
- Replacement of long-distance or telephone number services with local ISP connections at remote sites.
- Access to all data and applications (not just e-mail or file transfers) over the Internet.

DATA CENTER

- A **data center** is a facility used to house computer systems and associated components, such as telecommunications and storage systems. It generally includes redundant or backup power supplies, redundant data communications connections, environmental controls (e.g., air conditioning, fire suppression) and security devices.

Data Centre Network Model Description



Data Network Elements

- The data network elements model is based on a multi-layered model.
- The hardware used as building units for the distribution layer must have a backplane speed sufficient to handle the huge size of traffic passing through it. Also throughput value (in Million packets per second) is extremely important in ensure the capability of used modules to handle the passing traffic.

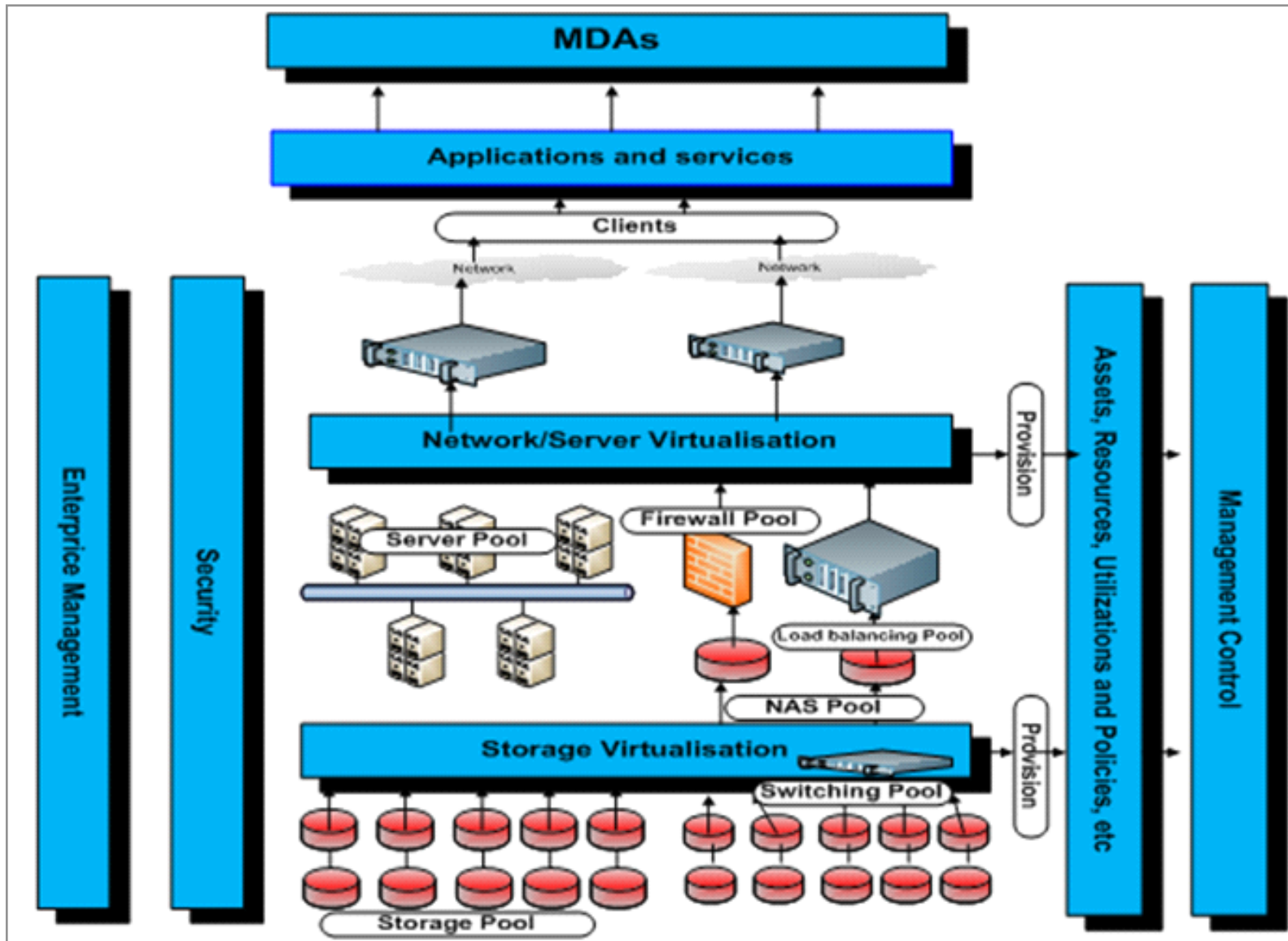
Choosing Data Centre Facilities

- It is assumed that the GoG shared Data Centre will be a Tier III facility, which means it will be composed of multiple active power and cooling distribution paths, but one path active, has redundant components and is currently maintainable, providing 99.98% availability.

Selecting Data Centre Facilities

- Some factors to be considered:
 - The existence of natural and man-made threats by accidental chemical spills, civil unrest, etc must be researched thoroughly by engaging the appropriate authorities for information on transportation accidents, hazardous materials incidents and other safety data for region.
 - Intentional threats such as sabotage and terrorism are harder to predict and more difficult to research but a risk analysis is required to raise questions about whether the location has landmarks, government buildings or prestigious building that are likely targets for terrorists, and what is the likelihood of civil unrest or rioting. Historically, densely populated urban areas carry more risk of attack than sparsely populated rural areas.

Components of The Data Centre



TIA 942 Based Approach to Data Centre Planning and Design

- The purpose of the standard is to establish a guideline for the various design and construction elements of both a large and small scale Data Center.

Cabling Pathways

- Cabling pathways in the Data Centre generally consist of a combination of access under a raised flooring system and overhead cable tray.

Enclosures and Racks

- Equipment enclosures and Rack space should be a very early consideration in the entire design process.
- Equipment enclosures and Racks should contain the required cabling and should utilise wire management.

Servers

- The server estate to be deployed will be 'server farms' based - different nodes supporting different layers of the architecture.

Virtualisation

- Virtualisation is the technique of abstracting functionality and management away from the physical implementation.
- The major areas for Virtualisation consideration include:
 - Server
 - Network
 - Storage

Storage

- Shared storage architectures at the primary and secondary Data Centres are divided into storage area networks (SANs) and network-attached storage (NAS).

SAN Design Recommendations

- Enterprise-level SAN's should at least include the following features:
 - Multiple independent fabrics;
 - Core plus edge switch topology;
 - Appropriate port aggregation ratio, depending on application server requirements;
 - Appropriate core design, depending on number of ports required;
 - Evolving design, with initial installation suitable for current needs. This will be key as MDA's will be migrated in sequence generally;
 - Providing a Secure SAN platform.

Backup/Recovery

- Backup concerns the capture of change to the data and recovery is to redo this change to get to a specific point-in-time.

ENTERPRISE SYSTEMS MANAGEMENT

- An Enterprise Systems Management (ESM) capability is required to support service delivery and support at the Data Centres.
- Enterprise systems management in a distributed environment is even more important than in traditional environments due to the increased number of geographically spread (hardware and software) components that have to be managed.

Problems Associated with ESM

- There are several problems associated with the traditional approach to managing systems which are addressed by ESM. These include:
 - Missed problems: Operators can overlook real problems;
 - False alarms: Messages can seem to indicate real problems, when in fact they are not;
 - Inconsistency: Various operators can respond differently to the same type of events;
 - Duplication of effort: Multiple error messages may be produced for a single problem;
 - Improper problem assignment: Routing problems to the support staffs that are not their responsibility;
 - Problems that cannot be diagnosed.

Important Processes

- The most important processes within ESM are:
 - Operations management;
 - Software control and distribution;
 - Fault management;
 - Change management;
 - Configuration management;
 - Capacity Planning;
 - Contingency management;
 - Security management;
 - Service level management.

Operations Management

- The various operations management cover key functional areas such as:
 - Single Point Operations and Systems Management;
 - Network Management (LAN's and WAN's);
 - On-line Performance Monitoring;
 - Desktop Remote Control;
 - Storage Device Management;
 - Database Management;
 - Distributed Print Management and,
 - Job Scheduling.

Software Control and Distribution

- Software distribution is the control of the packaging, distribution, and installation of software in a Distributed Systems Management environment.

Incident Management

- Incident management is the process of recording, assigning and the tracking of a problem, whether hardware, software or network related, from when it is first reported, until it has been resolved.

Change Management

- Change management is about the controlling of the process which is necessary for applying 'change requests' to a system.

Configuration Management

- Configuration management is an essential part of distributed systems management as it is the process of collecting, recording, maintaining, and the monitoring of the systems inventory within the organisation.

Capacity Planning

- Capacity planning is the process of modelling current and new systems in order to predict future growth requirements or available spare capacity.

Contingency Planning

- Contingency management is the process of providing backup environments that are capable of providing a disaster recovery capability in the event of systems failure for whatever reason.

Preventative Maintenance

- This is the process of fault avoidance.
- Through preventative maintenance, hardware, software and network potential faults are analysed and resolved before they actually become a problem.

Security Management

- Security administration refers to the configuration of system security parameters.
- Secure operation in a distributed environment requires that most or all of the following security services are available.

Service Level Management

- Service level management addresses the requirement to create service level agreements between customers and suppliers.

Module 7

SECURITY ARCHITECTURE REFERENCE MODEL

- The purpose of security is to protect and secure the government's information resources in order to provide an environment in which the Ghana's e-government business can be safely transacted.

Requirements

- The Security Architecture should provide for:
 - Availability of systems and data through:
 - Identification.
 - Authentication.
 - Authorization and access control.
 - Integrity of data
 - Confidentiality of data and system information.
 - Audit
 - Assurance

Security Architecture

- Security Architecture defines common, industry-wide, open-standards-based technologies and applicable industry best practices as the cornerstone elements required to enable secure and efficient transaction of business, delivery of services, and communications among its citizens, inter-government, other governments, as well as the private business sector.

Security Architecture Principles

- **Principle 1: Adhering to policies and statutes**
 - IT systems should be implemented in adherence with all security, confidentiality and privacy policies and applicable statutes.

Security Architecture Principles

- **Principle 2: Secure egovernment services**
 - Security Architecture must enable the government and its MDAs to perform business processes electronically and deliver secure e-government services to the public.

Security Architecture Principles

- **Principle 3: Value based security management**
 - Apply a level of security to systems and resources to commensurate with their value to the MDAs and sufficient to contain risk to an acceptable level.

Security Architecture Principles

- **Principle 4: Security audit and reporting**
 - For auditing and reporting purposes, accurate system date and time are essential to all security functions and accountability and must be maintained.

Security Architecture Principles

- **Principle 5: Use of industry standards**
 - Security Architecture must be based on industry-wide, open standards.

Security Architecture Principles

- **Principle 6: Protecting Government's information assets**
 - Utilising defense-in-depth and layered security approaches protects the government's information assets.

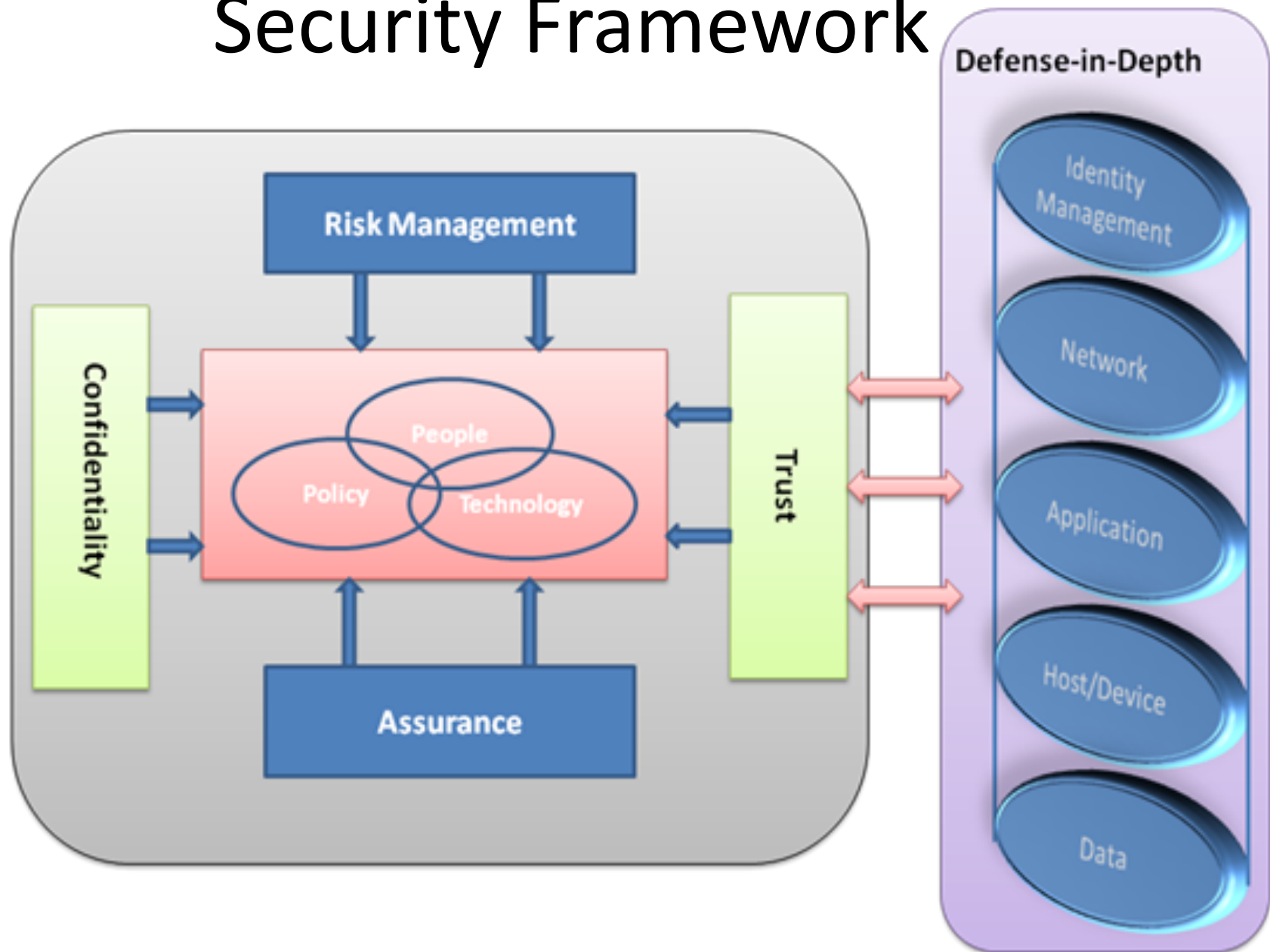
Security Architecture Principles

- **Principle 7: Interoperability**
 - Security is a critical component of individual MDA systems interoperability.

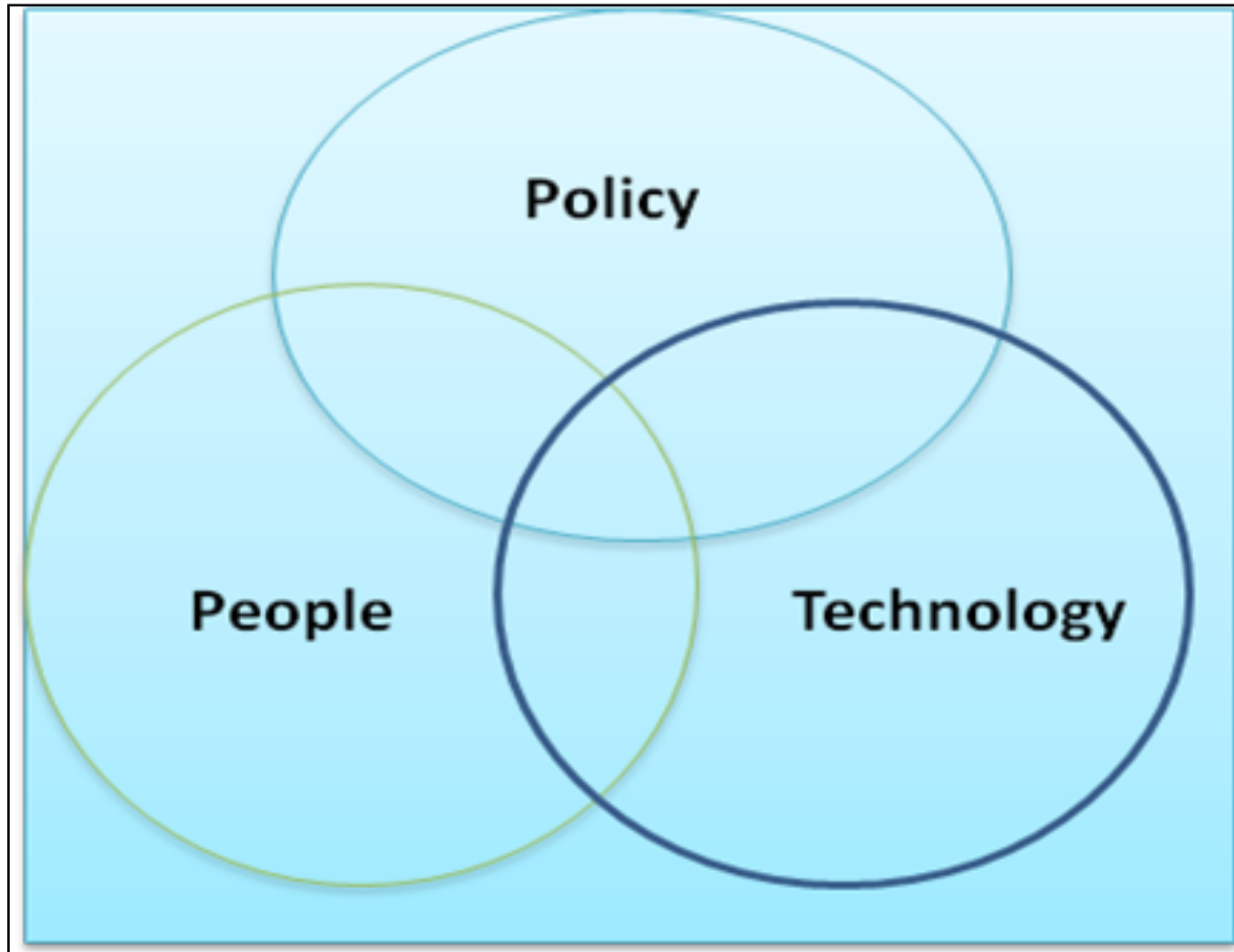
Security Architecture Principles

- **Principle 8: Security needs**
 - Security architecture should accommodate varying security needs.

Security Framework



The PPT Methodology



Confidentiality

- In the provisioning of government services online, it is inevitable that transactions will be conducted which requires Confidentiality.
- Confidentiality ensures that such information is accessible only to authorized users by enforcing the necessary level of secrecy at each stage of data processing and preventing unauthorized disclosure.

Confidentiality Model

Level	Definition	Examples	Standard / Policy
0	e-Government transactions that involve no private information content .	a citizen reading or downloading publicly available information from a government website.	No explicit confidentiality protection is needed at level 0 though care should still be taken to adopt good system practice.
1	e-Government transactions in which the information exchanged is client specific but where the impact of public exposure would be a minor resource or nuisance impact on one or more of the involved parties.	receiving an e-mail indicating that more sensitive information is available for collection from a secure mailbox.	Unpublished private information should be either stored on a system to which only authorized government users have physical access, or else should be password-protected.
2	e-Government transactions involving private information that could be regarded as sensitive.	electronic filing of income tax and Value Added Tax (VAT) returns. Disclosure of credit card details.	Data stored in a live environment (eg. on a database) should be protected by strong access control.

Risk Management

- Risk management is the process of conducting risk assessments and implementing the agreed mitigation strategies.

Trust

- According to the ws-trust v1.3 os trust is defined as follows:
“the characteristic that one entity is willing to rely upon a second entity to execute a set of actions and/or to make set of assertions about a set of subjects and/or scopes”.

Trust

- The ITU-T X.509, Section 3.3.54 defines trust as:
“Generally an entity can be said to ‘trust’ a second entity when the first entity makes the assumption that the second entity will behave exactly as the first entity expects.”

Trust Models

- Direct Trust
- Transitive Trust
- Assumptive Trust

Direct Trust

- Direct trust is when a relying party accepts as true all (or some subset of) the claims in the token sent by the requestor. It exists when you perform the validation of an entity's credentials without reliance on any other entity.

Transitive Trust

- Transitive trust is trust transmitted through another party. Transitive trust allows the following:
 - Entity A validates and trusts Entity B.
 - Entity B validates and trusts Entity C.

Assumptive Trust

- Assumptive trust is a formal name for a model that was earlier described as spontaneous trust. With this model, there is no mandatory, explicit, direct credential validation. With essentially no control over the validation process, you must either “take it, or leave it.”

- Some Trust Principles
 - Trust is a characteristic and quality of security architecture.
 - Trust exist on a gradient – The level of trust necessary for one MDA or citizen may be different from the level of trust for another MDA or citizen.
 - A direct trust model should be considered; with a central government agency (GicTED) as a certificate authority (CA) initiating all trust relationships for e-government transactions.

Assurance

- Assurance is the set of activities that create higher confidence in the system's ability to carry out its design goals even in the face of malicious abuse.

Assurance Levels

Four Assurance Levels

<u>Level</u>	<u>Description</u>
1	Little or no confidence in the asserted identity's validity
2	Some confidence in the asserted identity's validity
3	High confidence in the asserted identity's validity
4	Very high confidence in the asserted identity's validity

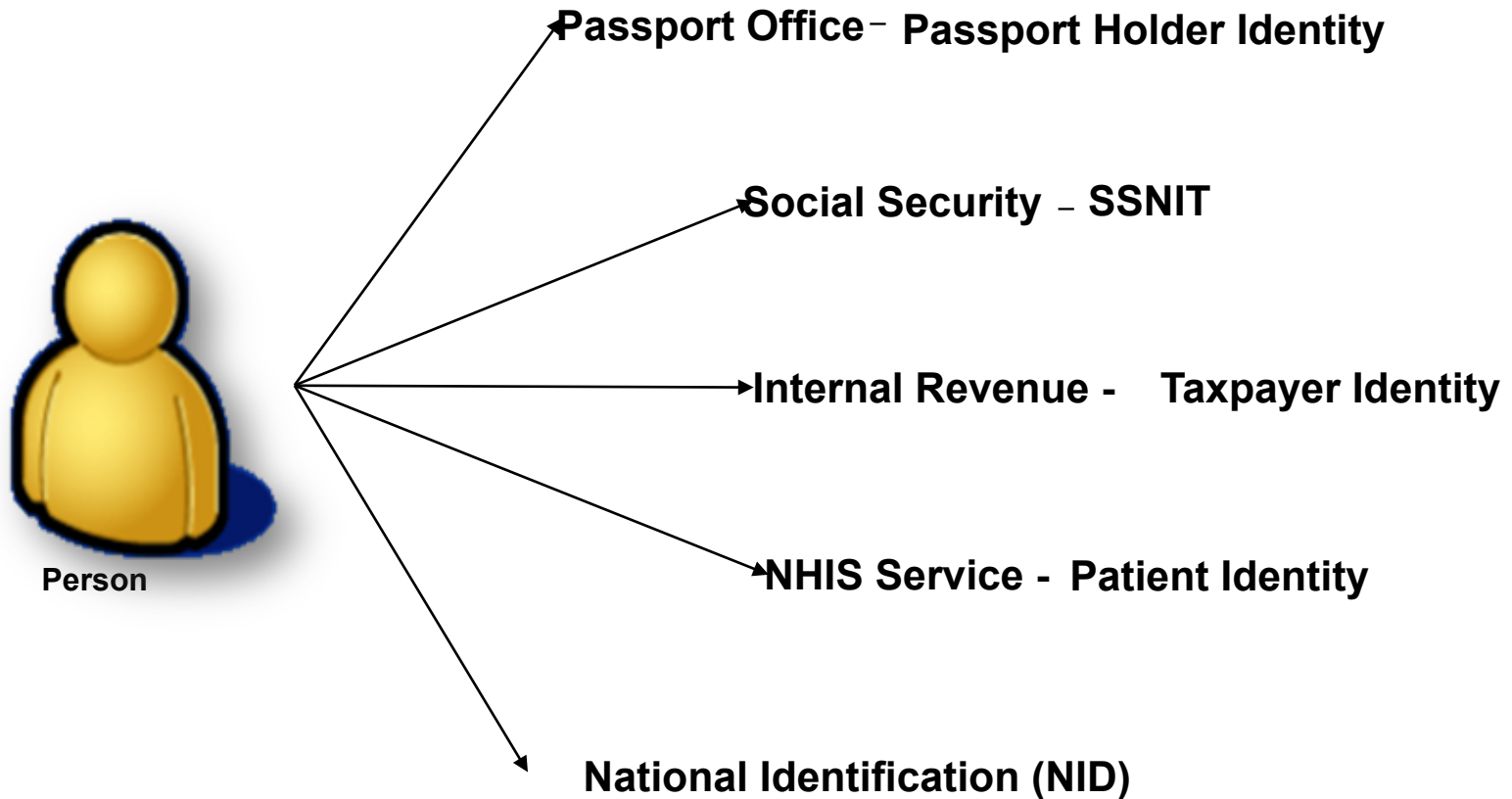
Identity Management

- The purpose of this section is to outline the set of core principles, technologies, policies and standards required to archive effective identity management within the Ghana e-government Enterprise Architecture.

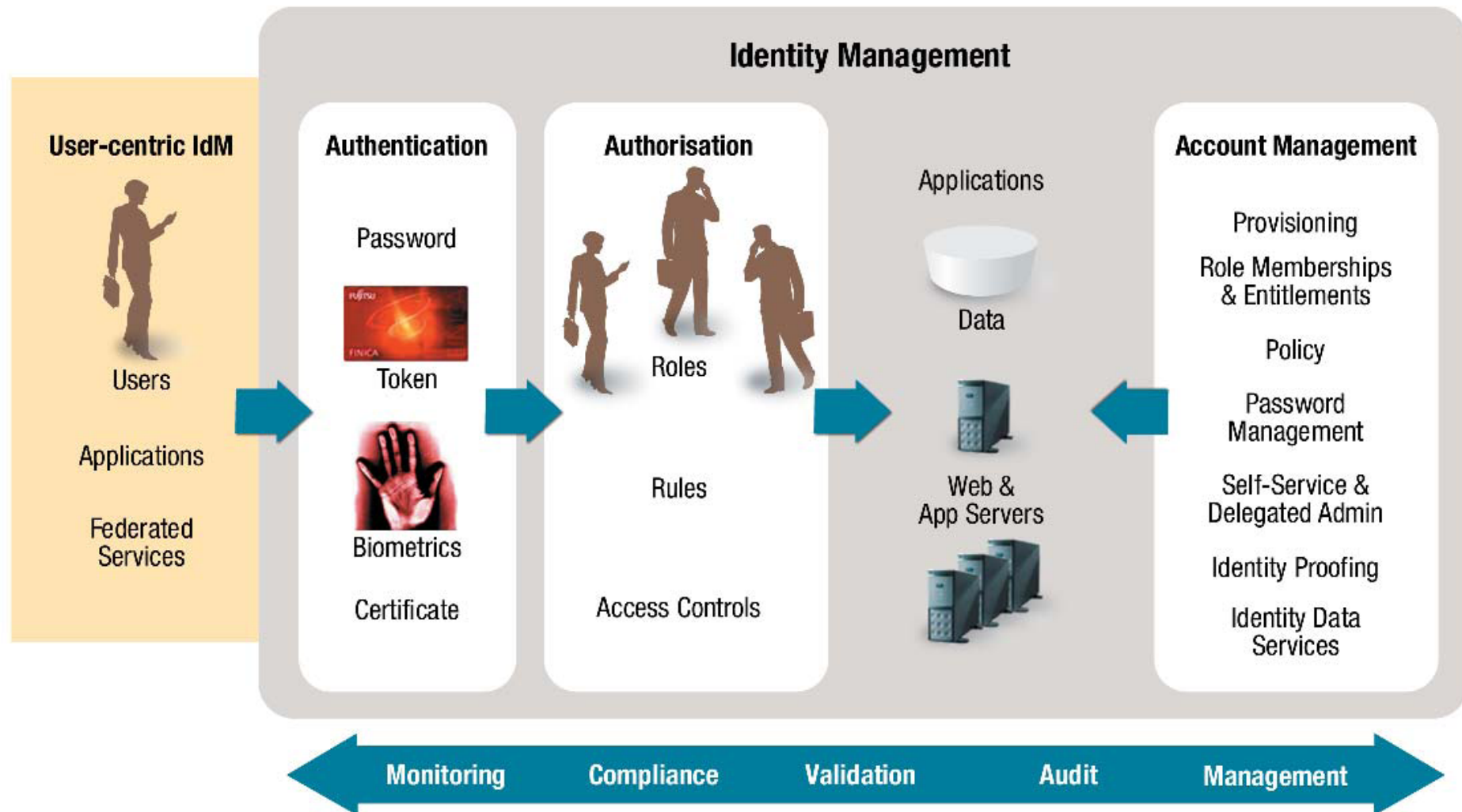
E-Identity Solutions

- The e-Identity solutions should be viewed as primarily a tool for:
 - Defining the identity of an entity (a person, place, or thing) for e-government services
 - Storing relevant information about entities, such as names and credentials, in a secure, flexible, customizable store
 - Enabling secure access to online credentials through a set of standard interfaces
 - Providing a resilient, distributed, and high-performance infrastructure for Identity Management that interacts with all e-government services.
 - Helping to manage the relationships to resources and other MDAs in a defined context

Identity



Identity Management Framework



Types of Principles

- The Principal entities initially covered by E-IDENTITY are people and businesses. Other entities, eg legal document identities, are candidates for consideration by later phases of work on e-Ghana identity interoperability.

Civil Servants

- There is no requirement for e-Ghana authentication of civil servants.

Business Representatives

- These are legally responsible authorities that represent the given business.

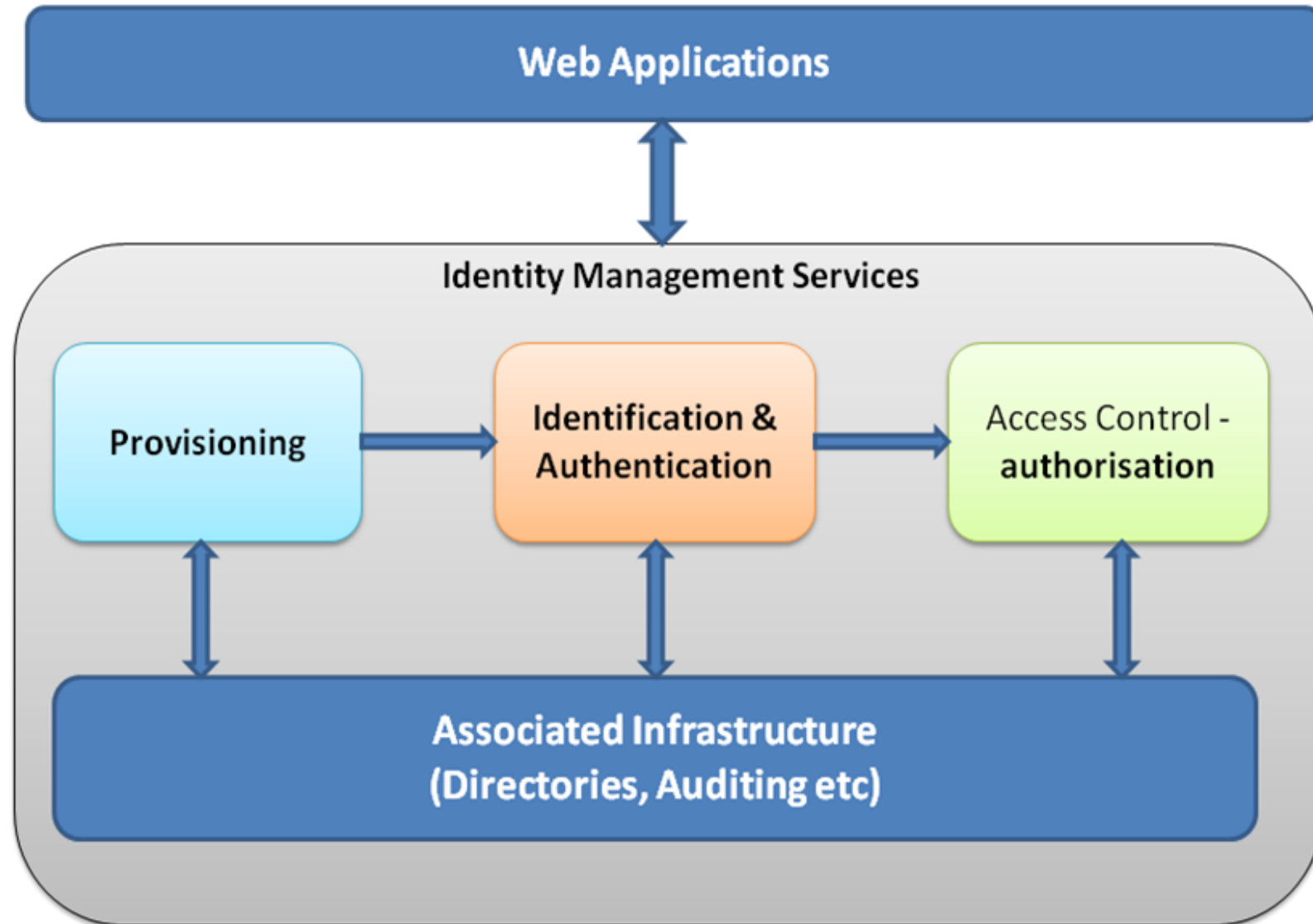
Private Citizens

- The services relating to private citizens (including employees) are the main focus of this version of this GGEA.

Business Authentication

- Business authentication is the process of confirming the identity of a business in terms of details about its registration in its country of origin.

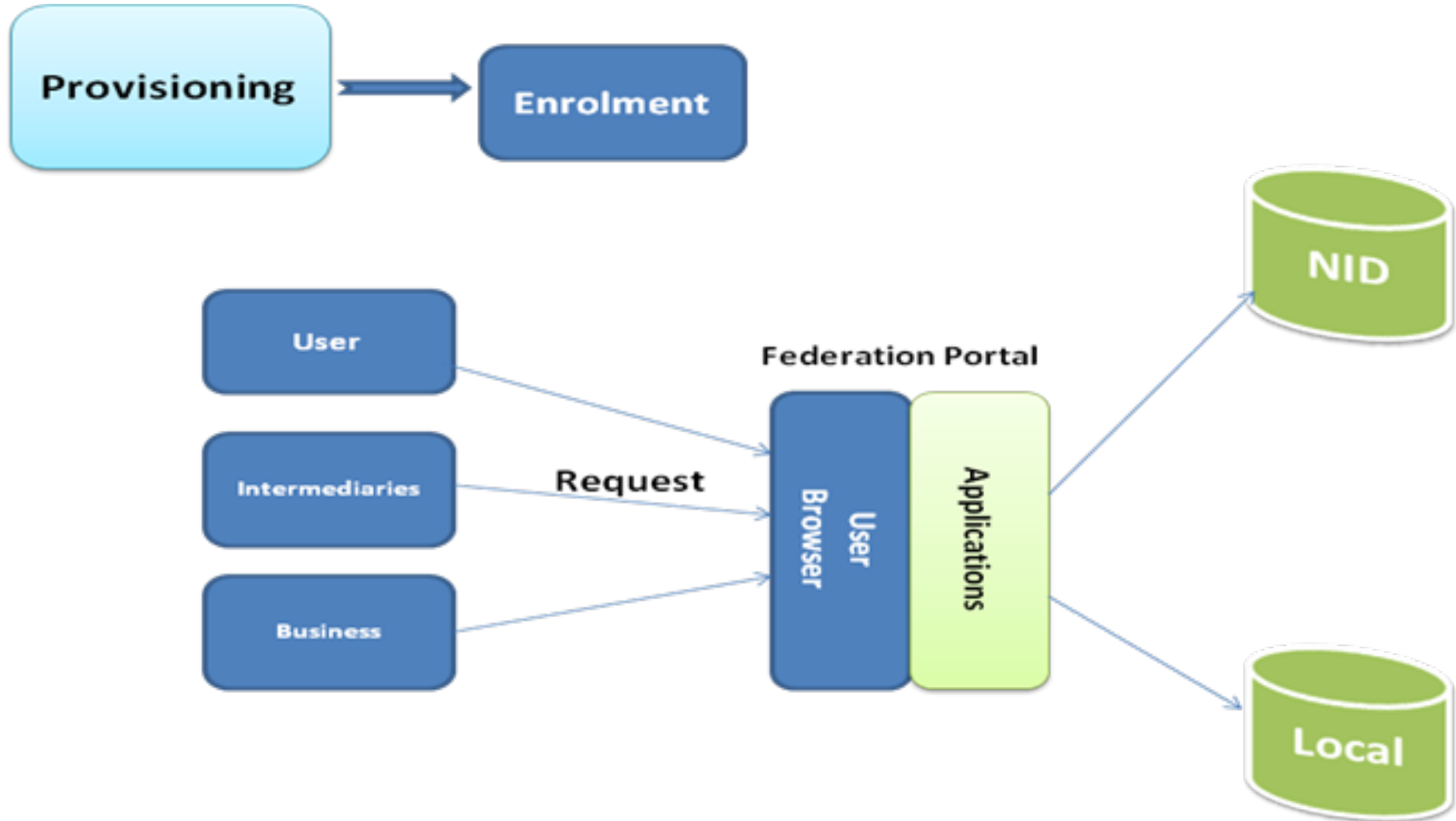
Technical Components



Categories

- The set of generic Identity Management Services under consideration, and therefore required to undergo further selection and classification, includes, but is not limited to, the following:
 - Provisioning Services
 - Authentication & Identification Services
 - Access Control Services
 - Associated Infrastructure Services

Category – Provisioning Services



Provisioning Services

- Identity Creation Services;
- Identity Attribute Input Services;
- Enrolment Services.

Category – Authentication & Identification Services

- Authentication Services
- Single Sign-On
- Identity Attribute Provision Services

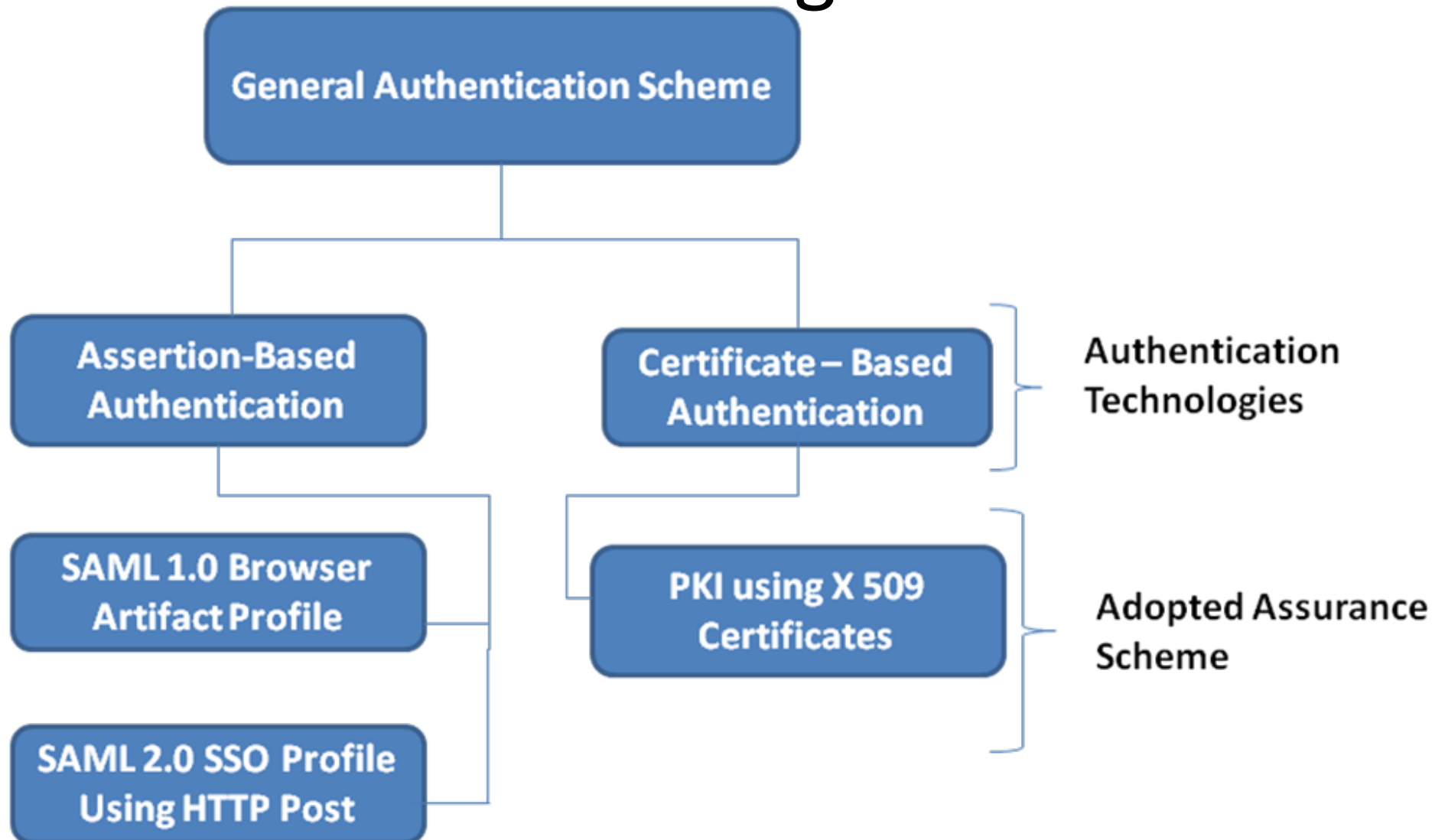
Category – Access Control Services

- Authorisation services; Commonly Role Based Access Control within applications;

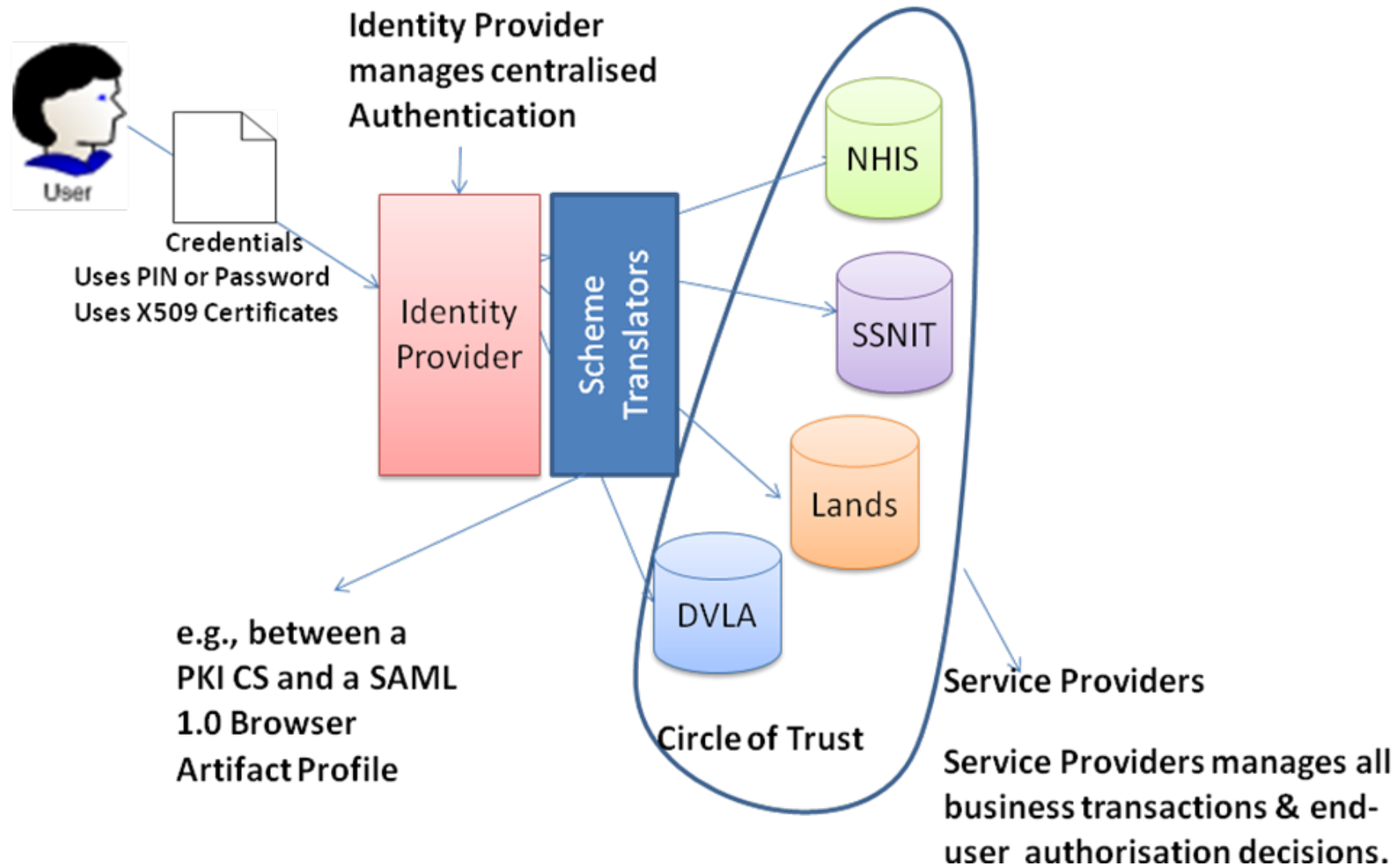
Category – Associated Infrastructure Services

- Directory Services;
- Broker Services;
- Security Services;
- Confidentiality Services;
- Interoperability Services;
- Transformation Services;
- Transport Services;
- Mobile Services.

Multiple Authentication Technologies



Federated Identity Management



Federation Subsystems

- Relying Party (Service Provider)
- Identity Provider (IP)
- Scheme Translators
- Federation Portal

Session Types

- The e-identity should support the following three session types:
 - Browser Session;
 - Authentication Session;
 - RP Session.

Use of Cookies

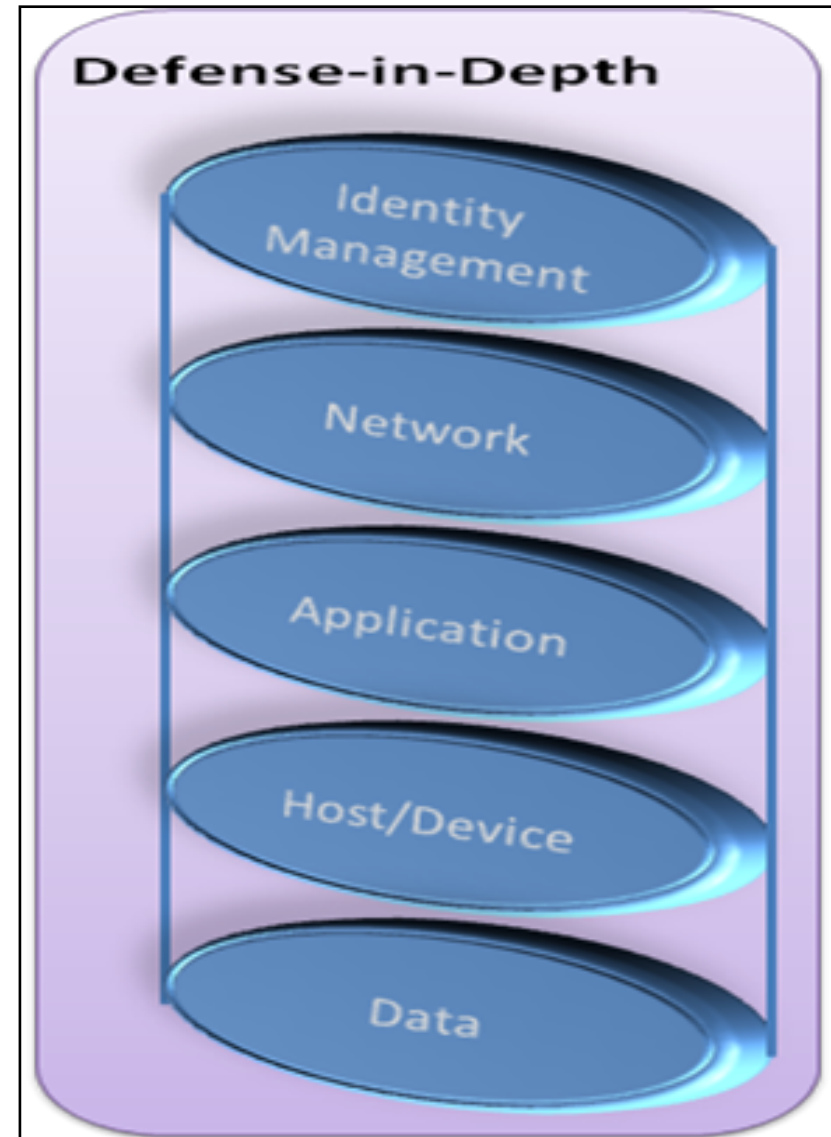
- Cookies should be an integral part of the e-identity.
- Cookies typically store information in the form of a session identification that does not personally identify the end user.

Types of Cookies

- IP Cookie;
- RP Cookie;
- Portal Cookie;
- Common Domain Cookie;
- Implementation-Specific Cookie.

Defence-in-Depth

- Defence-in-depth is a multilayered approach that applies multiple strategies to protect resources from external and internal threats.



Security Domains

Security Domain	Description	Technology
Network Domain		
NETWORK PERIMETER SECURITY	Firewall technology shall be employed at the edge of a budget unit's network including the Internet Gateway, to protect sensitive internal information assets and infrastructure from unauthorized access. External (inbound and outbound) traffic shall be routed through secure gateways, such as firewalls.	Application Gateway. Screened Routers
	Intrusion detection mechanisms or intrusion prevention tools should be incorporated into all servers connected to WANs and to all internetworking devices that serve as gateways between WAN network segments.	
ACCESS TO INTERNETWORKING DEVICES AND SHARED PLATFORMS	Internetworking devices (including routers, firewalls, switches, etc.) and shared platforms (including mainframes, servers, etc.) provide both access to and information about networks. They shall be controlled to prevent unauthorized access.	SSH, SNMP, RFC 1918, RFC 2827

Security Domains

DEMILITARIZED ZONE	Services provided through the Internet (Web-enabled applications, FTP, Mail, DNS, VoIP, etc.) shall be deployed on a Demilitarized Zone (DMZ) or proxied from the DMZ.	IETF Internet Draft proposals for NAT traversal, such as Connection Oriented Media Transport, Middlebox Communications (Midcom), Simple Traversal of UDP Through NAT (STUN), and Traversal Using Relay NAT (TURN)
EXTERNAL CONNECTION TO NETWORKS	External connections to networks shall be routed through secure gateways (as required above) and protected by the following encryption methods.	Triple DES, AES, MD5, Rivest Code 4 IPSec, TLS, WTLS, RADIUS

Security Domains

WIRELESS NETWORK ACCESS	WLAN security is being addressed in the transmission layer with the IEEE 802.11g standard or greater and at the IP applications layer with standards- and policy-based authentication and access control	IEEE 802.11x, IEEE 802.15 (Wireless Personal Area Network (WPAN), IEEE 802.16 (Wireless Metropolitan Area Network (WMAN) Wi-Fi Protected Access2 (WPA2) supports X.509, X9.68
VULNERABILITY SCANNING	Network and host vulnerability scanners should be used to test for the vulnerabilities of internal systems and of network perimeter defenses, as well as adherence to security policy and standards.	

Physical Security

- Access to Data Centre
 - Information systems (servers, storage, client devices, etc.), media storage areas, and related communication wiring and network devices shall be located in secure locations that are locked and restricted to access by authorized personnel only (facility physical plant permitting).

Physical Security

- Environmental Considerations for Data Centre
 - Information systems, media storage areas, and related communication wiring and network devices should be protected against loss or malfunction of environmental equipment or services necessary for the operation of the facility.

Physical Security

- Environmental Considerations for Data Centre
 - Information Risk Management
 - Critical Success Factors
 - Obtain Senior Management Support and Involvement
 - Assign Direct Responsibilities
 - Define Procedures
 - Involve Business and Technical Experts
 - Hold Units Responsible
 - Document and Maintain Results

Physical Security

— Risk Management Process

- Understand Organisational Context
- Identify the threats
- Assessing the threats

Physical Security

- Possible Sources of Threats

Intentional Threats	Terrorists People who dissatisfied with the organisation People with mental imbalance Criminals Insiders colluding with foreign enemies Hackers Malicious code
Unintentional Threats	Mis-operations from system users Mis-operations from system hardware
Natural Threats	Earthquake Volcanic eruption Hurricane Flood Thunder and lightning Hail

Physical Security

- Possible impact categories of threats are:
 - **Category I** - Death, loss of critical proprietary information, system disruption, or severe environmental damage;
 - **Category II** - Severe injury, loss of proprietary information, severe occupational illness, or major system or environmental damage;
 - **Category III** - Minor injury, minor occupational illness, or minor system or environmental damage;
 - **Category IV** - Less than minor injury, occupational illness, or less than minor system or environmental damage;

Physical Security

- Control Recommendations
 - Risk Aversion
 - Transfer of risk
 - Retaining the risk
 - Reduction of likelihood or consequences
 - Monitoring and Review

Module 8

IT PERFORMANCE MANAGEMENT MODEL

- The Information Technology Performance Management Model (ITPMM) is a framework to measure the impact of ICT services on overall MDA performance.

ITPMM Design

- The ITPMM is designed to serve three main purposes, which are;
 - Develop an ICT performance reporting mechanism to justify expenditure on IT projects;
 - Demonstrate the contribution of IT to the delivery of MDA operations and services;
 - Identify areas to be earmarked for process improvement.

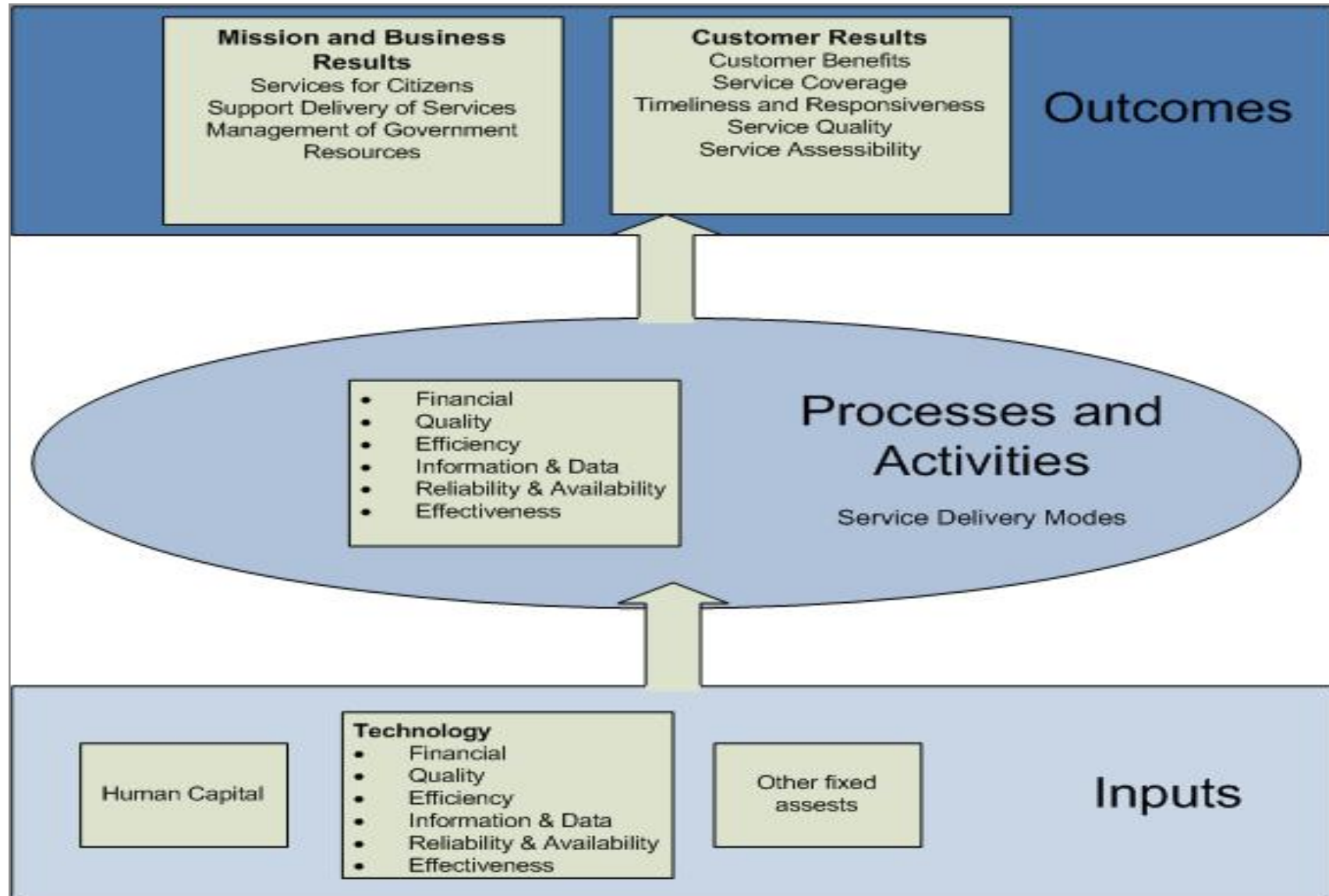
“Reference Models”

- The GGEA consists of a series of “reference models” which together make up the architecture:
 - Ghana MDA Business Reference Model (BRM)
 - Service Component Reference Model (SRM)
 - Technical Reference Model (TRM)

The ITPMM

- The ITPMM is structured around Measurement Domains, Measurement sub-domains, and Measurement Indicators.
 - Measurement Areas
 - Measurement Categories
 - Generic Measurement Indicators

The ITPMM Framework



Mission and Business Results Measurement Area

- Measurement Categories:
 - The Business domains in Government Frontline Services;
 - The domains in Government Services Support;
 - The domains in Enterprise Management.

Citizen Results Measurement Area

- Measurement Categories:
 - Citizens Benefit - Citizens satisfaction levels and tangible impacts to citizens as a result of the services provided;
 - Service Coverage - The extent to which the targeted citizen population is being served and citizens are using the services;
 - Timeliness & Responsiveness - Time it takes to respond to citizens inquiries and requests and the time it takes to deliver services;
 - Service Quality - Quality of service from the citizen's perspective
 - Service Accessibility - Availability of the services to the citizen and the extent of self-service options and automation.

Processes & Activities

Measurement Area

- Measurement Categories:
 - Financial - Achieving financial measures, direct and indirect total and per unit costs of producing services, and costs saved or avoided;
 - Productivity & Efficiency – The amount of work accomplished per relevant units of time and resources applied;
 - Cycle Time & Timeliness - The time required to execute service;
 - Quality - Error rates and complaints related to the service;
 - Security & Privacy - The extent to which security is addressed;
 - Management & Innovation - Management policies and procedures, compliance with applicable requirements, capabilities in risk mitigation, knowledge management, and continuous improvement.

Technology Measurement Area

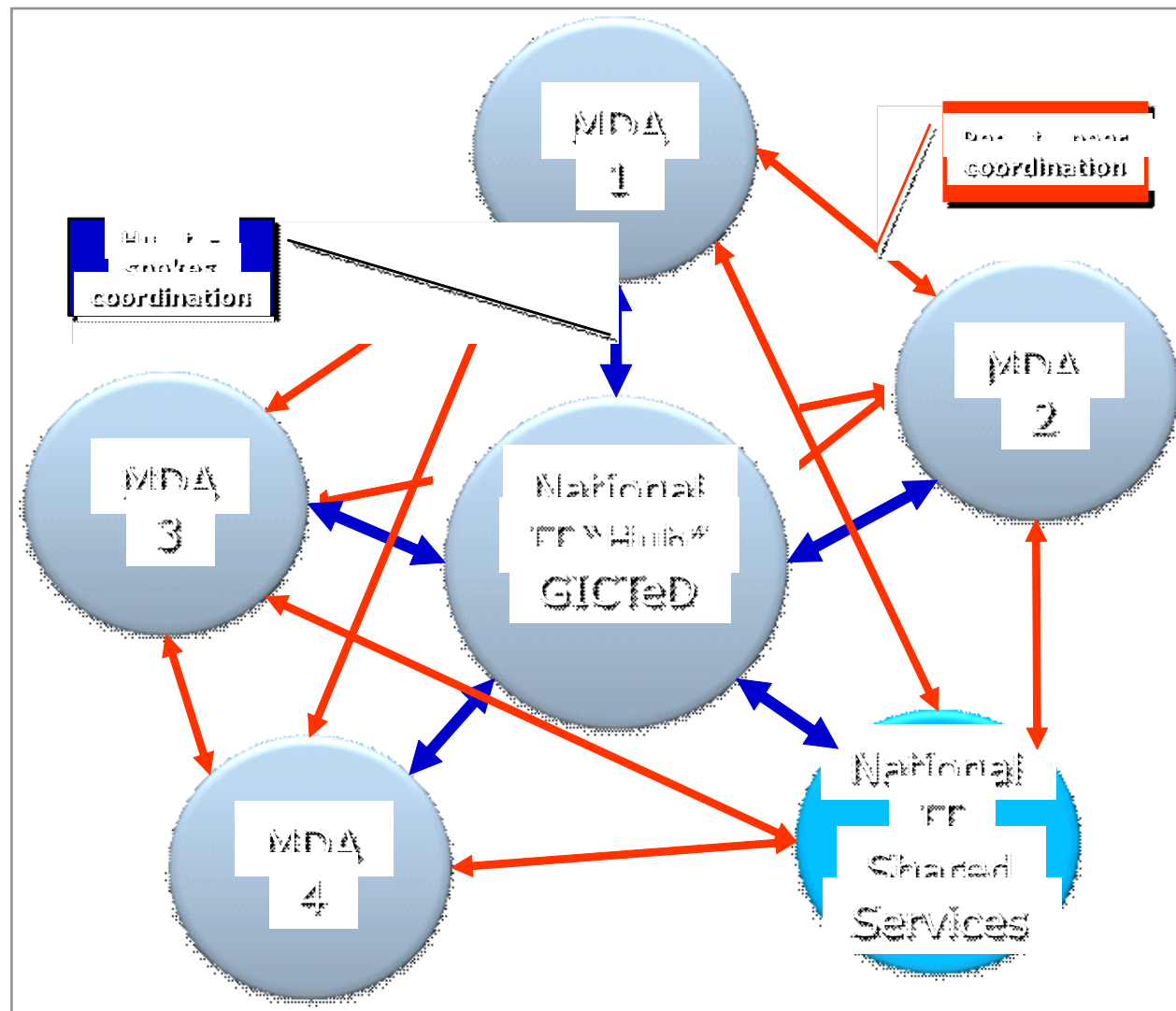
- Measurement Categories:
 - Financial: Technology-related costs and costs avoided through reducing or eliminating IT re-dundancies;
 - Quality: The extent to which technology satisfies functionality or capability requirements or best practices, and complies with standards;
 - Efficiency: System or application performance in terms of response time, interoperability, user accessibility, and improvement in technical capabilities or characteristics;
 - Information & Data: Data or information sharing, standardisation, reliability and quality, and storage capacity;
 - Reliability & Availability: System or application capacity, availability to users, and system or application failures;
 - Effectiveness: Extent to which users are satisfied with the relevant application or system, whether it meets user requirements and its impact on the performance of the services it enables and the citizens or mission results to which it contributes.

Module 9

GOVERNANCE MODEL

- The key to a new governance model for GoG's IT organisations is the emphasis on the linkage between national and local MDA business needs and IT expectations.

Federated Governance Model



The New Governance Model

- The new governance model is based on the following Institute of IT Governance principles:
 - IT Strategic Alignment
 - Value Delivery
 - Risk Management
 - Performance Management
 - Resource Management

Organisation

- At the heart of the GoG's governance model is a formal management framework and structure that will enable GICTeD and MDAs to mutually manage the relationship, expectations, dependencies and services.

Central Standards Authority

Name	Central Standards Authority
Purpose	Manage the maintenance of standards and policies across Government
Goals	Ensure interoperability and the management of risk to the Government
Responsibility	• Provide technology guidelines • Monitor relevance of latest developments in IT from a business perspective • Consult/advise on the selection of technology within standards • Assist in variance review • Advise on infrastructure products • Direct technology standards and Practices • Ensure vulnerability assessments of new technology occur • Verify compliance with technology standards and guidelines
Authority	Assist GICTeD in management of standards and policies
Membership	Selected representatives from the MDAs
Meetings	Regular (Once a month) and adhoc
Escalation Points	Director General - GICTeD

Processes

- MDA EA Assessment Methodology
 - The EA Assessment framework will be based on EA Capability Maturity Model (CMM) to determine the level of an agency's EA maturity.

Processes

- New Project Business Case Process
 - The IT Governance function within the MDA will normally define two complementary processes:
 - The Enterprise Architecture function, which will be required to prepare a series of Project Impact Assessments - project-specific views of the EA that will illustrate how the architecture impacts on the major projects within the MDA. (These are sometimes referred to as project slices through the architecture.)
 - The IT Governance function will define a formal Architecture Compliance Review process, for reviewing the compliance of projects to the Enterprise Architecture.

Architecture Compliance Reviews

- An architecture compliance review is a scrutiny of the compliance of a specific project against established architectural criteria, spirit, and business objectives. A formal process for such reviews normally forms the core of an enterprise architecture compliance strategy.

Purpose

- Some goals of an architecture compliance review include some or all of the following:
 - First and foremost, catch errors in the project architecture early, and thereby reduce the cost and risk of changes required later in the life-cycle. This in turn means that the overall project time is shortened, and that the business gets the bottom-line benefit of the architecture development faster;
 - Ensure the application of best practices to architecture work;
 - Provide an overview of the compliance of an architecture to mandated enterprise standards;
 - Identify where the standards themselves may require modification;
 - Identify services that are currently application specific but might be provided as part of the enterprise infrastructure;

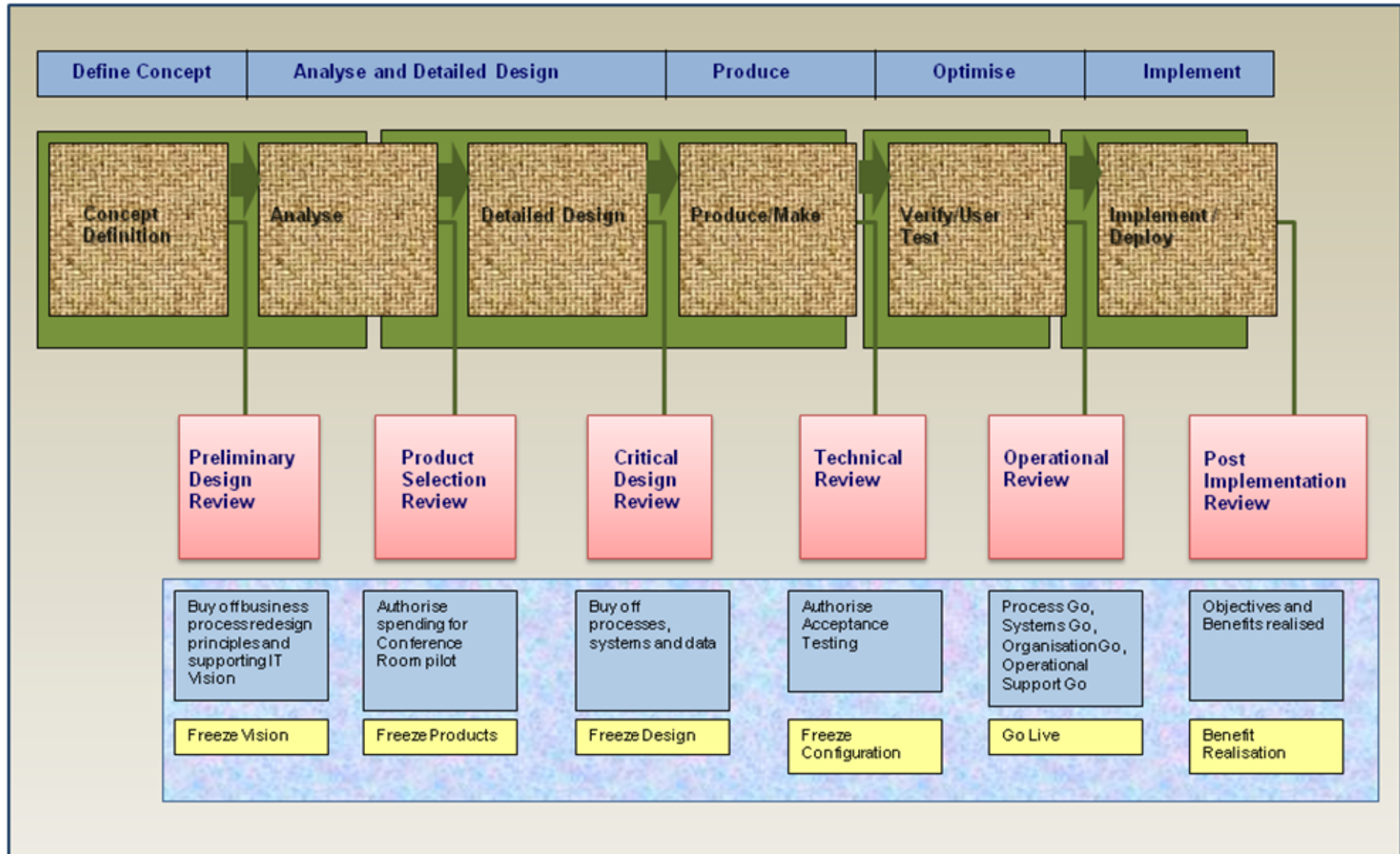
Timing

- The Architecture Compliance Review is typically targeted for a point in time when business requirements and the systems architecture are reasonably firm and the project is taking shape, well before its completion.

Governance & Personnel Scenarios

- In terms of the governance and conduct of the architecture compliance review, and the personnel involved, there are various possible scenarios.

Technical Quality Gate Process



SOA Governance

- . SOA governance is ultimately about control, laying down the law on process and policy, and then enforcing it within an organisation to ensure IT delivers quality applications and services that meet business needs.

SOA Governance Processes

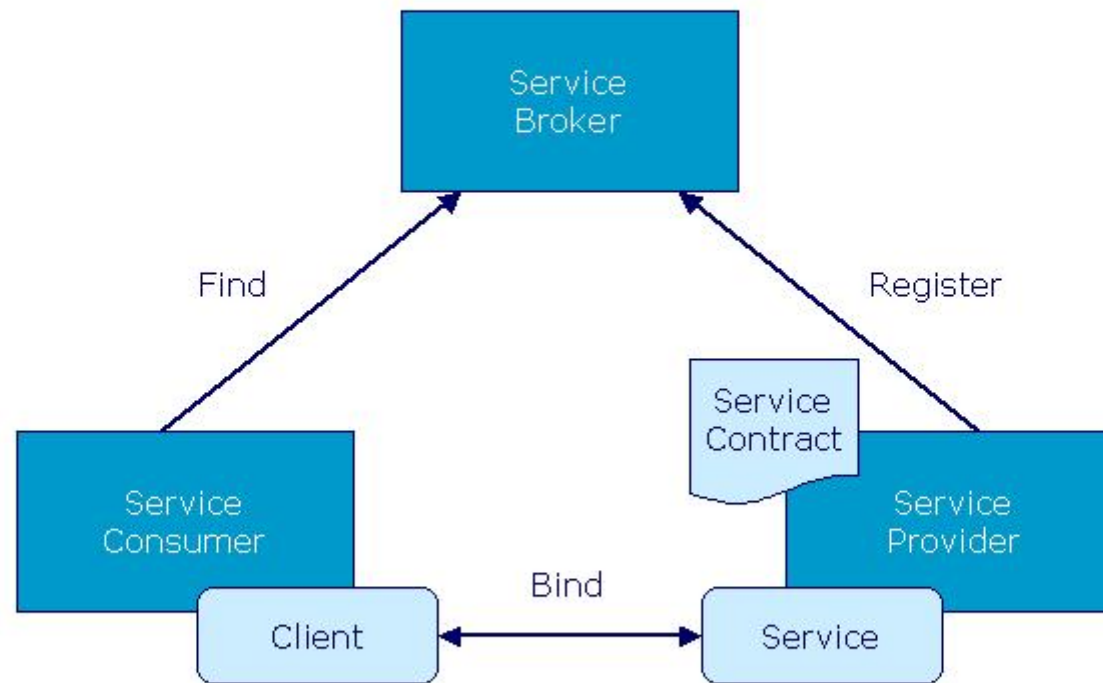
- Four primary functions needed for SOA governance are provided by the registry/repository:
 - Validation;
 - Cataloguing;
 - Relationship management;
 - Collaborative process/policy enforcement.

Module 10

SERVICE ORIENTED ARCHITECTURE

- “This technology can be best described as a collection of services. The services interoperate with each other and can be accessed without knowledge of the underlying platform implementation.” (cxotoday.com)

Find, Bind and Execute

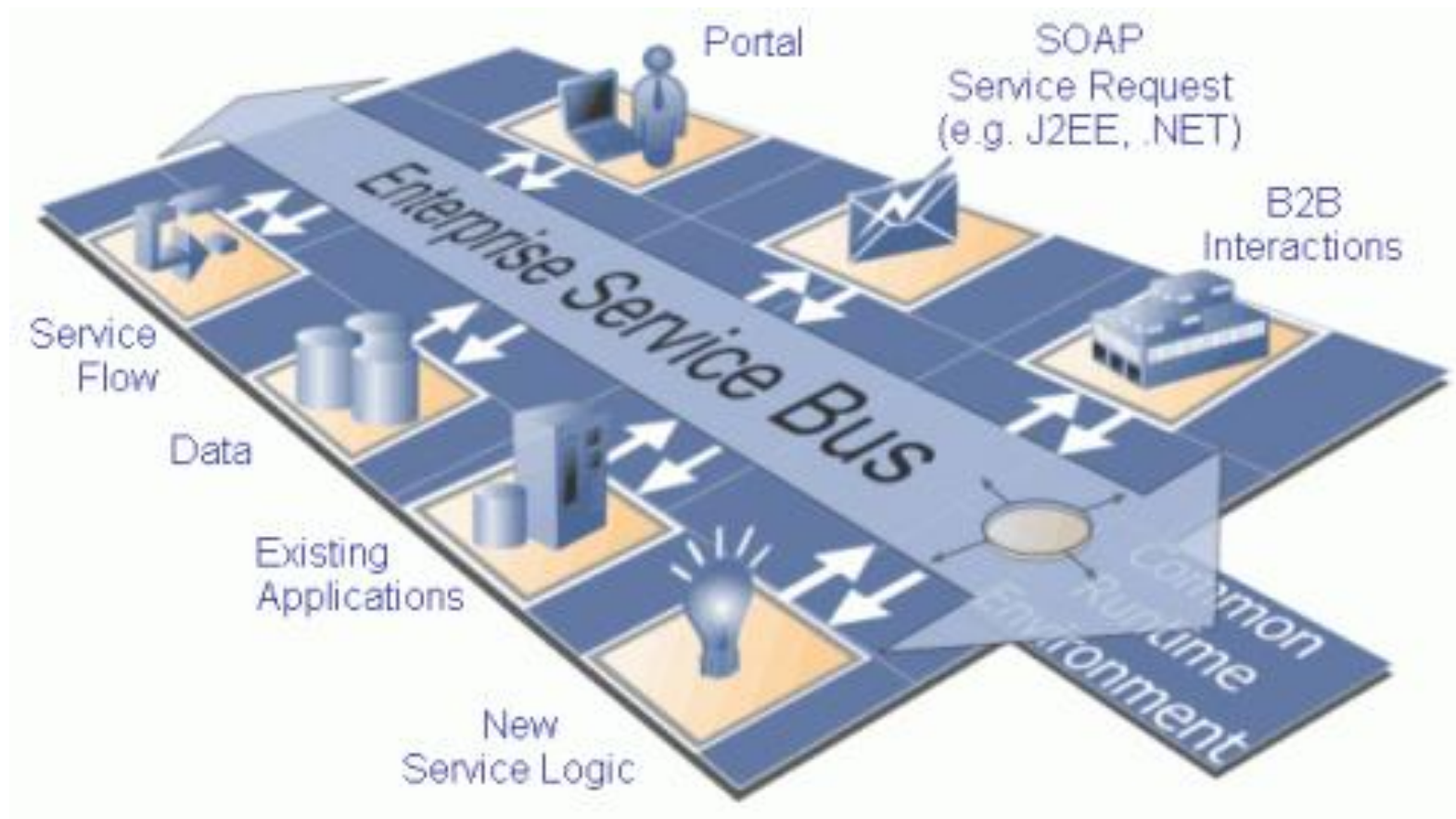


Characteristics of SOA

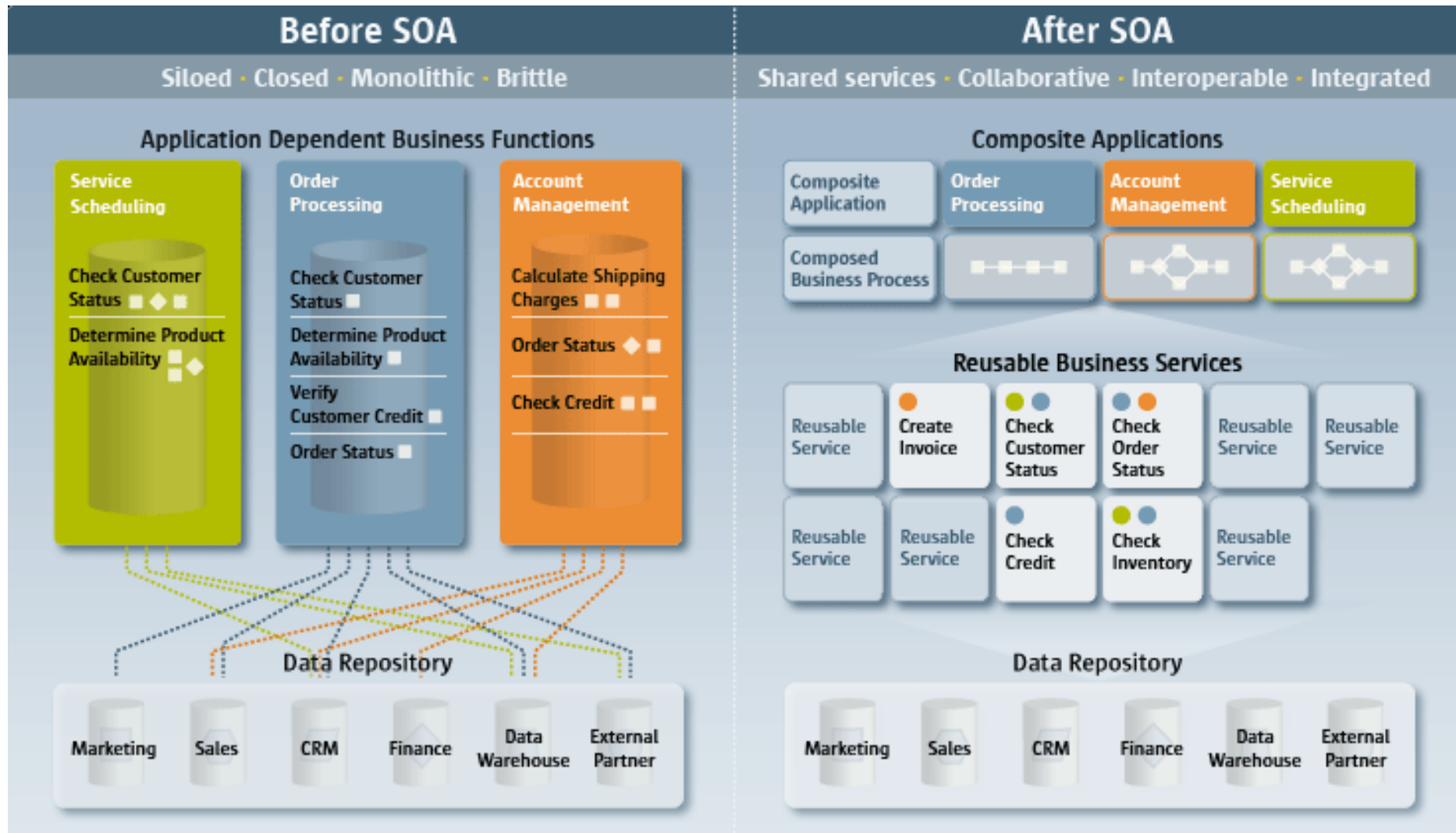
- *Loose coupling* of services with operating systems, programming languages and other technologies which underlie applications;
- Flexible;
- Not hard-wired – services can be replaced;
- Lower cost than integrated systems;
- Easier Integration;
- Faster to change.

First Step to Implementing SOA

- Enterprise Service Bus



Effects of SOA on an Organization's Business Functions



Module 11

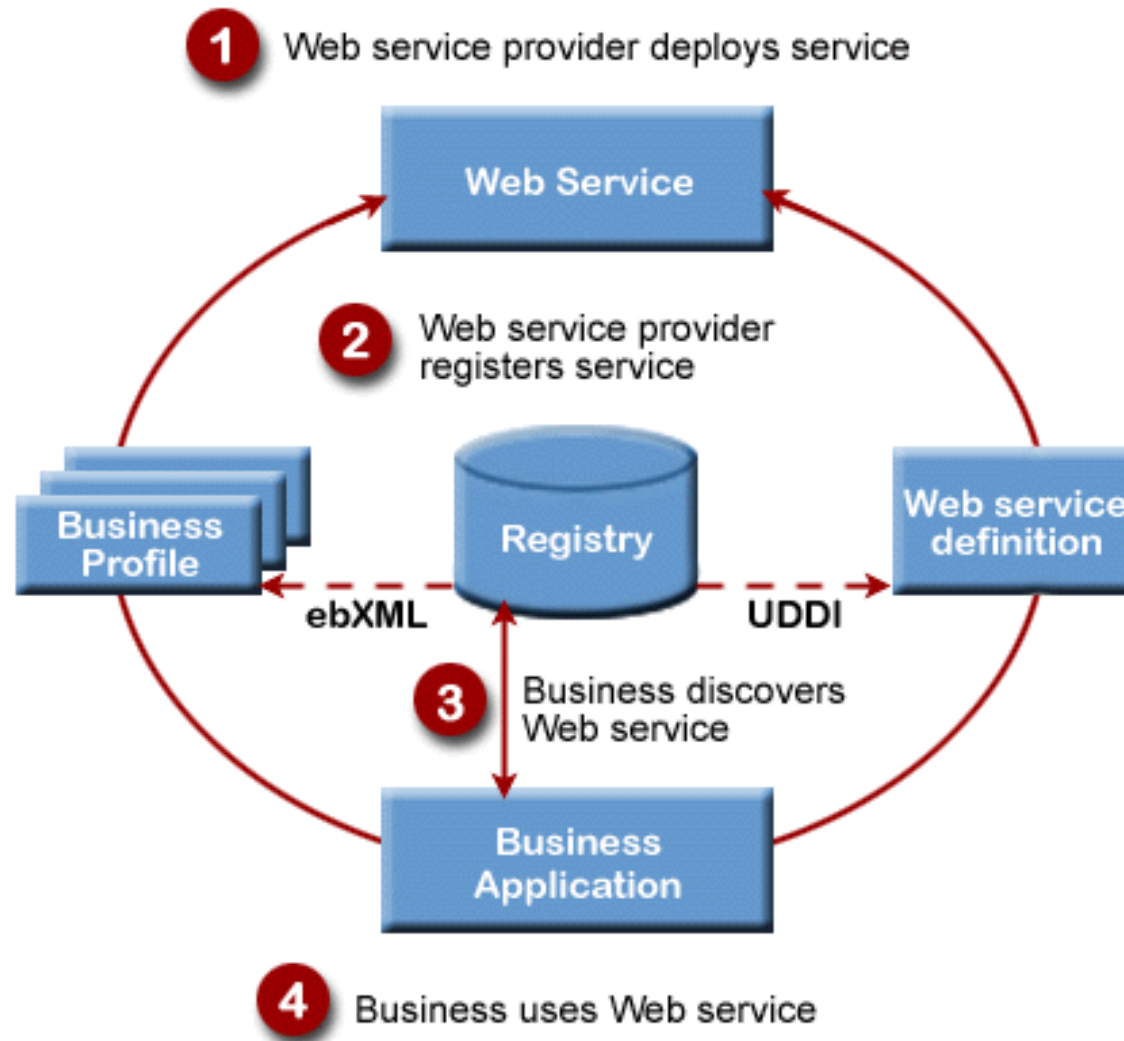
WEB SERVICES

- Web services describes a standardized way of integrating Web-based applications using the XML, SOAP, WSDL and UDDI open standards over an Internet protocol backbone.

Features of Web Services

- Web services are application components;
- Web services communicate using open protocols;
- Web services are self-contained and self-describing;
- Web services can be discovered using UDDI;
- Web services can be used by other applications;
- XML is the basis for Web services.

How to use a Web Service



How does it work?

- **The basic Web services platform is XML and HTTP.**
 - The HTTP protocol is the most used Internet protocol.
 - XML provides a language which can be used between different platforms and programming languages and still express complex messages and functions.

Web Services Platform Elements

- SOAP (Simple Object Access Protocol)
- UDDI (Universal Description, Discovery and Integration)
- WSDL (Web Services Description Language)

Web Services Function

- Unlike traditional client-server models Web services do not provide the user with a GUI. Web services rather share business logic, data and processes through a programmatic interface across a network (the applications interface, not the users).
- Developers can then add the Web service to a GUI (such as a Web page or an executable program) to offer specific functionality to users.” (webopedia.com)

Main Uses of Web Services

- Web Services have two main types of uses:
 - Reusable Application Components;
 - Connect Existing Software.

Thank you!