



Ghana Government Enterprise Architecture Assessment Framework

ABBREVIATIONS

Term	Definition
GGEA	Ghana Government Enterprise Architecture
EA	Enterprise Architecture
MDA	Ministries Departments and Agencies
GICTeD	Ghana ICT Directorate
GoG	Government of Ghana
CIO	Chief Innovation Officer
QAC	Quality Assurance Committee
RFP	Request for Proposal
CMM	Capability Maturity Model



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1. Introduction

The Ghana Government Enterprise Architecture (GGEA) framework provides the MDAs with a foundation for two essential activities:

- ☐ Performing strategic planning and investment management;
- ☐ Providing direction for systems engineering activities in support of their business needs.

Effective management and strategic decision-making for ICT investments, require an integrated view of the organisation, understanding the interrelationships among the different units, their operational processes and the information systems that support them.

Enterprise Architecture (EA) formalises the identification, documentation, and management of these interrelationships, and supports the management and decision processes. The GGEA is used for key activities such as:

- ☐ Strategic planning;
- ☐ Business process engineering and redesign;
- ☐ Coordinating operations across the MDA;
- ☐ Consolidating or standardising similar functions;
- ☐ Introducing automation to improve upon manual processes;
- ☐ Taking advantage of major new enabling technologies;
- ☐ Reallocation of resources.

This assessment document is a key deliverable of the project and it provides the framework for assessing the maturity of Enterprise Architecture efforts of the Ministries, Departments and Agencies (MDAs). The GGEA Assessment Framework is designed to improve the effectiveness of EA across the public sector. The document serves as the basis for EA assessment by GICTeD or appointed EA standards authority to ensure the GGEA principles and standards are adopted and used to improve ICT deployments and operations. It serves as the bedrock for strategic decisions on ICT investments, ensuring that MDA technology investments are aligned with their EA requirements.

One of the objectives for defining the framework is to provide a better understanding of the current state of the MDAs and then assist them to improve their EA implementation. It will allow the agencies to identify their weaknesses and strengths through the assessment process, enabling them to define the appropriate improvement strategies. The assessment framework will also define the framework to transform the MDAs' IT from their current state to the strategic state and the additional business value that transformation can deliver.



2. General Assessment Structure

This report is designed for two primary audiences:

- Senior managers responsible for creating and maintaining business applications and also serving as business and industry experts charged with making rational decisions for applying technology to the needs of the business.
- Project team leads and Enterprise Architects playing a significant role in developing EA architecture.

The MDAs are looking to deploy composite applications to enhance corporate decision-making and provide access to data, increase operational efficiencies, and reduce the overhead costs associated with maintaining information silos spread across the enterprise. This can only be achieved by assessing and improving key IT processes such as EA definition and maintenance.

To improve the role of EA in the MDAs, we have defined the framework as an aid in conducting architecture review or assessments. The goal is to enhance the overall odds for success of the MDAs EA by identifying weak areas and providing a defined path towards improvement. As an EA matures it should increase the benefits it offers the MDA. The organisations will make heavy investments in the development of enterprise-wide IT architectures but the government we must ensure that they continue to build on previous efforts and fully realise the benefits of EA.

Industry best practice indicates that government agencies should similarly manage their EA efforts according to capability maturity models and this report describes a framework that provides the key ingredients for improving the EA process. It defines the evolutionary steps to improve the overall process that starts out in an ad hoc state, transforms into an immature process, and then finally becomes a well defined, disciplined, and mature process.

Undertaking a current state architecture assessment is the best way to understand how MDAs IT is aligned/misaligned with organisational goals and to identify where re-architecting can improve ICT costs, functionality and efficiency.

The GGEA Assessment Framework consists of five levels and a number of architecture characteristics. The general five levels are described below:

- **Level 1 (None)** - either an organisation does not have plans to develop and use EA, or it has plans that do not demonstrate an awareness of the value of having and using EA. While Level 1 MDAs may have initiated some EA activity, their efforts are ad hoc and unstructured, lack institutional leadership and direction, and do not provide the management foundation necessary for successful EA development.
- **Level 2 (Beginning)** - An organisation at Level 2 recognises that the EA is a corporate asset by vesting accountability for it in an executive body that represents the entire enterprise. At this stage, an organisation assigns EA management roles and responsibilities and establishes plans for developing EA products and for measuring programme progress and product quality; it also commits the resources necessary for developing the EA; people, processes, and tools. Specifically, a Level 2 MDA has designated Enterprise Architect responsible for EA development and maintenance. Further, it has established an EA committee with the responsibility for EA governance



(i.e., directing, overseeing, and approving architecture development and maintenance). The MDA has also defined its EA based on the GGEA.

- **Level 3 (Established)** – MDA at Level 3 focuses on developing architecture products according to the selected GGEA framework, methodology, tool, and established management plans. Roles and responsibilities assigned in the previous stage are in place, and resources are being applied to develop actual EA products. Here, the scope of the architecture has been defined to encompass the entire organisation.
Although the products may not be complete, they are intended to describe the organisation in business, performance, information/data, service/application, and technology terms (including security explicitly in each), as provided for by the GGEA framework. Further, the EA products are to describe the current (“as-is”) and future (“to-be”) states and the plan for transitioning from the current to the future state.
- **Level 4 (Improved)** – MDA at Level 4 has completed its EA products, meaning that the products have been approved by an EA steering committee and CIO or IT Director. The completed products collectively describe the enterprise in terms of business, performance, information/data, service/application, and technology for both its current and future operating states, and the products include a transition plan for sequencing from the current to the future state. Further, GICTeD has assessed the quality (i.e., completeness and accuracy) of the EA products.
- **Level 5 (Optimised)** – MDA at Level 5 has secured senior leadership approval of the EA products and a written institutional policy stating that IT investments must comply with the architecture, unless granted an explicit compliance waiver. Further, decision-makers are using the architecture to identify and address ongoing and proposed IT investments that are conflicting, overlapping, not strategically linked, or redundant. Thus, Stage 5 entities are able to avoid unwarranted overlap across investments and ensure maximum systems interoperability, which in turn ensures the selection and funding of IT investments with manageable risks and returns. Also at Level 5, the organisation tracks and measures EA benefits or return on investment, and adjustments are continuously made to both the EA management process and the EA products.

We provide a summary of the assessment levels in the table below.

Table 1: Assessment levels summary

Level	Description	EA Characteristics
1	None - No EA process in place	1. No EA exist or yet to be defined 2. No structures in place to develop EA
2	Beginning – EA process is being developed	1. No standard or centralised EA process is in place but there is the desire to build one 2. Minimum linkage to business strategy and drivers 3. Limited management involvement



		4. Limited Business involvement 5. EA existence not communicated 6. Security and compliance considerations ad hoc 7. Little or no adherence to standards 8. No direct involvement of strategic planning and procurement personnel
3	Established – EA process and the Reference Models defined	1. EA process is well defined and followed 2. EA is linked with business plans and goals 3. Senior management are aware and committed to EA 4. Most business units do participate in the EA process 5. EA documents are widely publicised and Reference Models and standards are also published 6. IT security profile is developed and incorporated into EA 7. Governance in place to oversee ICT investments 8. ICT procurement are governed by architecture standards
4	Improved – EA process is managed and measured	1. EA process is inherent in MDA culture (Quality metrics are captured) 2. EA Architecture reflects business, data, application and technical domains 3. Senior managers participate in architecture reviews 4. All business units are involved in the Architecture process with no exception 5. Architecture documents are updated regularly and frequently reviewed for latest developments/standards 6. Metrics associated with ICT performance are in place and are measured regularly. 7. Governance process mature and variances feed back into EA 8. All procurements are guided and governed by the EA
5	Optimised – Continuous improvement of the EA process	1. Continuously optimise and improve architecture process 2. EA process metrics are used to optimise and drive business linkages and business involved in the continuous



- improvement of the process
- 3. Senior management involved in optimising EA process and governance
- 4. Entire organisation is aware of the importance of EA and work within the EA principles and standards

3.The Assessment Process

The GGEA Assessment Framework provides a reference point against which to determine if an MDA's ICT unit is engaged in the processes necessary for its success in meeting the objectives of the enterprise. The framework identifies the following characteristics, which will be used for the assessment:

1. Enterprise Architecture process development – is the development of the master plan which “acts as a collaboration force” between aspects of business strategies and governance principles; aspects of business operations such as business terms, organisation structures, processes and data; aspects of automation such as information systems and databases; and the enabling technological infrastructure of the business such as computers, operating systems and networks.
2. Business & IT alignment - the objective is to establish a trusted relationship between the business and IT that allows for an innovation driven climate in which IT becomes a strategic enabler for the transformation of the MDA. It consists of a framework in which processes, communications, IT functions and technology decision making are further synchronised and aligned to ensure a full integration of the business goals and objectives with the IT strategy.
3. Senior management commitment - is required for any initiative to be successful. Simply stated without their commitment or demonstrated leadership, initiatives stall, fall substantially short of the expectation or just fail.
4. Business participation – the involvement of the business in the EA process is necessary for the success of its implementation. Business process owners must sign off all architectures to ensure they meet their needs.
5. Architecture communication – the degree of awareness in the organisation of the EA process. The EA must be communicated to all staff to remove any anxieties and reduce level of resistance to MDA transformation.
6. Security & Compliance – ensuring that risks to the business are minimised with the introduction of new technologies.
7. Governance – ensuring that standards are effectively maintained across the organisation.



8. IT procurement strategy – ensuring investments in ICT infrastructure is presented and approved based on business, not technical, grounds. Business units should involve IT in the development of their business cases and the definition of changes to business process.
9. Completion of the EA by the MDA to drive the transformation agenda;
10. Use of EA to drive improved decision-making;
11. Results achieved to improve the MDA’s programme effectiveness;
12. Transition and transformation strategies are in place to improve the role of ICT in the MDAs;
13. Cost savings and cost avoidance - the MDA EA must be achieving demonstrable benefits to the MDA in cost savings and cost avoidance for IT investments.
14. EA change management and EA deployment - the MDA should have the ability to effectively manage changes to EA artefacts, including documents and any EA repositories. The MDA should have the ability to deploy EA content out to their user community, including deployment of a repository, communications and training.

There will be two types of assessments whereby GICTeD (or the appointed assessment team) will conduct an annual, comprehensive assessment of an MDA’s EA. In addition, MDAs are expected to submit quarterly progress reports on their success in achieving the milestones set forth in their EA implementation plan.

Both the annual and quarterly reviews are discussed below.

3.1 ANNUAL EA ASSESSMENT PROCESS

The annual assessment process is intended to be a comprehensive review of the state of the MDA’s EA programme. They are expected to review their EA programmes at an appointed time (by GICTeD) and submit the results of the evaluation to GICTeD for further analysis. GICTeD will assess the MDA’s EA and provide a final assessment rating and feedback for improvement. The EA reference models (Business, Application/Service, Data, Technical and Performance) will be assessed separately for their maturity levels and the appropriate transition strategies to the future state. The maturity levels of the reference models are:

3.1.1 BUSINESS ARCHITECTURE

The MDAs are expected to define a set of business processes, aligned to the GGEA Business Architecture Reference Model (BARM), linked to layers of the MDA’s EA and used to inform investment decision making. An effective EA must be business-driven, requiring alignment between the IT architecture layers and business processes.



Table 2: Business Architecture Maturity Levels

Description	BARM Characteristics
None - No BARM process in place	Activities: The MDA has no Business Architecture Reference Model (BARM) or it is partially identified for the lines of business and sub-functions and has mapped these to the GGEA BARM Artefact: Baseline Business Architecture
Beginning – BARM process is being developed	Activities: The MDA has identified its current lines of business and sub-functions and has mapped these to the GGEA BARM and is in the process of developing the business architecture. Artefact: Baseline Business Architecture
Established – BARM process and the reference model defined	Activities: The MDA has established the target lines of business and sub-functions and has mapped these to the GGEA BARM. There is line of sight between the business layers of the target architecture to other layers of the architecture. Artefact: Target Business Architecture
Improved – BARM process is managed and measured	Activities: The MDA has completed business architecture for its core mission business processes. This includes complete target business processes, and demonstrates line of sight between the other layers of the architecture. The relevant business owner has authorised the segment business architecture in writing. The MDA Transition Strategy includes initiatives with milestones to achieve the target business architecture and to implement business architecture elements Artefacts: Transition Strategy
Optimised – Continuous improvement of the BARM process	Activities: The MDA has developed the different segments of the BARM, which includes target business processes and demonstrate line of sight between the other layers of the architecture. The relevant business owners have authorised segment business architectures in writing. The MDA Transition Strategy includes initiatives with milestones to achieve the target business architecture and to implement business architecture elements. Artefacts: Transition Strategy



3.1.2 DATA ARCHITECTURE

This describes the MDAs data described at the level of business data entities, linked to the GGEA Data Reference Model (DARM) and other layers of the MDA's EA. The data architecture is the key to identifying data sharing and exchange opportunities both within and across agencies.

Table 3: Data Architecture Maturity Levels

Description	DARM Characteristics
None - No DARM process in place	Activities: The MDA has not data architecture or has partially documented the elements of its baseline data architecture, including data assets and data stewards as defined by the DARM. Artefact: Baseline Data Architecture
Beginning – DARM process is being developed	Activities: The MDA has documented its baseline data architecture as defined by the DARM. MDA data assets are managed as programme resources. Artefact: Baseline Data Architecture
Established – DARM process and the reference model defined	Activities: The MDA has well established and documented target data architecture as defined by the DARM. The target data architecture defines the MDA's enterprise target data assets. Artefact: Target Data Architecture
Improved – DARM process is managed and measured	Activities: The MDA has taken steps to implement its target data architecture in coordination with internal and external stakeholders. The relevant business owner has authorised the data architecture in writing. Artefacts: Transition Strategy
Optimised – Continuous improvement of the DARM process	Activities: The MDA is actively participating in cross-agency communities of interest and other initiatives. It has adopted and implemented data standards for internal agency resources to shared, cross-agency, data assets where appropriate. The MDA has completed the data architecture and the relevant business owners have authorised segment architectures in writing. Artefacts: Transition Strategy



3.1.3 SERVICE (APPLICATIONS) ARCHITECTURE

This architecture describes the MDA's applications services linked to the GGEA Service Architecture Reference Model (SARM) and other layers of the MDA EA. The SARM is the foundation for identifying opportunities for reuse both within and across MDA.

Table 4: Service Architecture Maturity Levels

Description	SARM Characteristics
None - No or little SARM process in place	Activities: The MDA has not yet or partially identified the baseline systems/applications and service components. Artefact: Baseline SARM
Beginning – SARM process is being developed	Activities: The agency has identified the baseline systems/applications and service components for the agency, and has mapped these to the GGEA SARM as well as any other relevant MDA-level SARM. Artefact: Baseline SARM
Established – SARM process and the reference model defined	Activities: The MDA has established the target systems/applications and service components for the MDA as well as their interfaces to external applications. Artefact: Target SARM
Improved – SARM process is managed and measured	Activities: The MDA has developed and approved the SARM and the relevant business owner has authorised the SARM. The MDA's Transition Strategy includes initiatives and milestones to achieve the target applications architecture. Artefacts: Transition Strategy, SARM
Optimised – Continuous improvement of the SARM process	Activities: The MDA's applications architecture is well established and used consistently to deploy all necessary application services. The applications/service architecture for each segment is integrated into the overall MDA EA. The relevant business owners have authorised the segment architectures. Artefacts: Transition Strategy, SARM



3.1.4 TECHNICAL ARCHITECTURE

The technology architecture contains an inventory of deployed and approved technologies linked to the GGEA Technical Architecture Reference Model (TARM) and other layers of the MDA EA; providing a basis for standardisation opportunities. The technology architecture provides a basis to identify opportunities for technology standardisation both within and across the MDA.

Table 5: Service Architecture Maturity Levels

Description	TARM Characteristics
None - No or little TARM process in place	Activities: The MDA has not yet or partially identified the baseline technology products and standards and has mapped these to the GGEA TARM and eGIF standards. Artefact: Baseline Technology Architecture
Beginning – TARM process is being developed	Activities: The MDA has identified the baseline technology products and standards for the MDA and has mapped these to the GGEA Technology Architecture Reference Model (TRM). Artefact: Baseline Technology Architecture
Established – TARM process and the reference model defined	Activities: The MDA has established the target technology products and standards for the MDA, and has mapped these to the Technical Architecture Reference Model (TARM). The target architecture demonstrates line of sight between the other layers of the architecture. Artefact: Target Technology Architecture
Improved – TARM process is managed and measured	Activities: The MDA TARM is established and includes complete target technology architecture and demonstrates line of sight between the other layers of the architecture. The relevant business owner has authorised the segment technology architecture. The MDA's Transition Strategy includes initiatives and milestones to achieve the target technology architecture and to implement elements from relevant cross-agency initiatives. Artefacts: Transition Strategy, TARM
Optimised – Continuous improvement of the TARM process	Activities: The MDA's technical standards are established and mature in terms of their application. Technology architectures for each segment are integrated into the overall agency EA. The relevant business owners have authorised the segment architectures. Artefacts: Transition Strategy, TARM



3.1.5 PERFORMANCE ARCHITECTURE

The GGEA defines a Performance Architecture Reference Model (PARM) which describes ICT based performance management processes. The MDAs are expected to define the performance measurement indicators, which are linked to their strategic plans. The EA is used to help track improved MDA performance and it must clearly demonstrate how it furthers the strategic objectives and aligns to well-defined performance goals. To achieve this, it is important to identify meaningful performance measurement indicators.

Table 6: Performance Architecture Maturity Levels

Description	PARM Characteristics
None - No or little PARM process in place	Activities: The MDA has no or yet to identify performance measurement areas and categories (based on the GGEA PARM) for its baseline architecture. Artefact: Baseline Performance Architecture
Beginning – PARM process is being developed	Activities: The MDA has identified performance measurement indicators (based on the GGEA PARM) for its baseline architecture. Artefact: Baseline Technology Architecture
Established – PARM process and the reference model defined	Activities: The MDA has identified performance measurement indicators (based on the GGEA PARM for its target architecture. Quantified target values are identified for each measurement indicator. The target performance architecture addresses priorities and performance objectives identified in the MDA's strategic plan, and demonstrates line of sight between the other layers of the architecture. Artefact: Target Performance Architecture
Improved – PARM process is managed and measured	Activities: The MDA has completed the baseline and target performance measures. The relevant business owner has authorised the segment performance architecture in writing. The MDA's Transition Strategy includes the achievement of performance targets as milestones within the transition sequencing plan. This includes the performance targets from relevant cross-agency initiatives. The transition sequencing plan shows the level of performance improvement to be achieved at specific points in time. Artefacts: Transition Strategy, PARM
Optimised – Continuous improvement of the PARM process	Activities: The MDA has a mature PARM process and continues to developed improvement mechanisms to ensure



performance management is consistent with MDA strategy.

The agency's Transition Strategy includes the achievement of performance targets as milestones within the transition sequencing plan. Performance milestones in the Transition Strategy are complete and updated. Performance measurement indicators and processes are monitored, measured and updated on a regular basis.

Artefacts: Transition Strategy, PARM

3.2 QUARTERLY REVIEW PROCESS

The quarterly reporting process will compliment the annual GICTeD assessment process. GICTeD will use the quarterly EA reporting process to work collaboratively with MDAs to identify concrete milestones the MDAs can achieve in order to improve the effectiveness of their EA programmes. Quarterly milestones should focus the MDA on improving its EA programme in areas identified for improvement during the previous annual assessment. As a result, the quarterly milestones should advance the maturity of the EA programme so the MDA can achieve business performance improvements that will be assessed during the next annual EA assessment cycle.

The results of the quarterly EA reporting process will be reflected in a progress report for GICTeD. The results will also be published on the GGEA Web site.