South African Government Interoperability Framework

Using Enterprise Architecture to achieve Interoperability

Julius Segole
Chief Information Officer
Department of Social Development
Chairperson: GITO Council
Presentation Outline

• Interoperability Rationale
• South African Approach
• Enterprise Architecture
• South African Interoperability Framework
• Future developments
• Interoperability Rationale
An ideal Architect

An ideal architect should be a man of letters, a mathematician, familiar with historical studies, a diligent of philosophy, acquainted with music, not ignorant of medicine, learned in the responses of jurisconsultis, familiar with astronomy and astronomical calculations.

- Marcus Vitruvius Pollio (Roman Architect – 25BC)
More than a technical challenge

- Objective: Sell more Cola in Middle East
- Challenge: Language
- Solution: Use Pictures
- Outcome: Drop in Cola Sales
- Why: They read from RIGHT-TO-LEFT
Rationale

- Soon after the democratic changes in South Africa a presidential commission on the transformation of government highlighted the challenges facing the new government.

- Among the challenges were:
  - lack of co-ordination,
  - incompatibility of systems and architecture,
  - waste of resources,
  - IT not business process driven.
The Interconnectedness of Government

- Activities in Government do not occur in isolation
- Government is large, complex and interconnected
- Its systems are large, complex but disconnected

The disconnected nature of systems within Government has a major impact on the lives of its Citizens and the quality and efficiency of the services
Disconnectedness - Social Cluster Example

- Tackling poverty remains one of Government’s top moral and political imperatives yet getting help from Government remains difficult
- Citizen has to ‘integrate’ Government by following arduous administrative processes
- Gathering proof-of-eligibility alone can often take up to 24 months if not forever
- Other impacts include:
  - Duplication of administrative processes
  - Fraud and double-dipping
- These has a negative implication for the achievement of Development Goals of the country
But the real challenges are

- **Diverse and Fragmented** ICT Planning Methods (Frameworks and Processes) → Inconsistent EA Plans and reporting.
- **Incomplete** ICT System inventories in Government.
- Departmental EA **Capability Maturity**
- Unclear ICT **Governance** (responsibilities and guidance)
- Moving from “**techno-centric**” → “**information centric**” → “**Business Centric**” (exchanging data efficiently and integrate service delivery).
- Collaboration & Cooperation → National priorities **poorly co-ordinated and contracted**
- The priority of **Performance over Conformance** result in **low** levels of interoperability.
- **Regulation and Security complexities** often default to isolation of systems.
• South African Approach
Regulatory drivers*

• Chap 1, Part III:B,C – Strategic Planning
  – Define Core Objectives
  – Describe Core and Support Activities
  – Specify the Functions & Structures
  – Specify the Main Services to customers

• Chap 1, Part III:E – Information Planning
  – Establish an Information Plan
  – Establish an Information Infrastructure Plan; and
  – Establish an Operational Plan to implement the above

• Chap 5 – e-Government Compliance
  – Comply with “ICT House of Values”
  – Comply with MISS (Security Standard)
  – Comply with MIOS (Interoperability Standard)
  – Comply with GWEA (planned)

* Public Service Regulations, 2001 (amended Mar 2009)
Government developed ICT House of Values*

ICT Planning (GWEA) → ICT Acquisition → ICT Operations

Security → Interoperability → Reduced Duplication → Economies of Scale → Digital Inclusion

Lower Cost
Increased Productivity
Citizen Convenience

ICT Value
Principles / Pillars
Means / Foundation / Services

* From e-Government Policy, SITA Regulations & SITA Act (amended)
### MIOS / GWEA Product Evolution

<table>
<thead>
<tr>
<th>Year</th>
<th>Architecture</th>
<th>Interoperability</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001 - 2003</td>
<td>MIOS v1&amp;2</td>
<td>UK e-GIF</td>
</tr>
<tr>
<td></td>
<td>GITA v1.0</td>
<td>XML</td>
</tr>
<tr>
<td></td>
<td>MIOS v3</td>
<td>UML</td>
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<tr>
<td>2004 - 2006</td>
<td>MIOS v4</td>
<td>ODF</td>
</tr>
<tr>
<td></td>
<td>GITA v1.1</td>
<td>UML</td>
</tr>
<tr>
<td>2007 - 2009</td>
<td>MIOS v4.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GWEA v1.0</td>
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</tr>
<tr>
<td></td>
<td>GWEA v1.2</td>
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</tbody>
</table>

**MIOS** = Minimum Interoperability Standards  
**GWEA** = Government Wide Enterprise Architecture  
**GITA** = Government IT Architecture
* From Forsberg & Mooz and ISO 15288; Corporate Governance not shown
• Enterprise Architecture
TOGAF-9 (8 Parts, 52 Chapters, 744p)

**Architecture Capability Framework**
(Part VII)

**Architecture Development Method**
(Part II)

**ADM Guidelines & Techniques**
(Part III)

**Architecture Content Framework**
(Part IV)

**Enterprise Continuum & Tools**
(Part V)

**TOGAF Reference Models**
(Part VI)

**People**
(Skills, Certification, Roles, Governance, Structures)

**Process**
(Methods, Steps, Techniques)

**Outputs/Deliverables**
(Diagrams, Models, Viewpoints, Matrices, Catalogues, Tables)

**Technologies**
(Tools, Reference Models, Standards)

**NEW in TOGAF-9**
GWEA 1.2 Purpose & Applicability

• Purpose
  – To define the minimum standard by which to use an Enterprise Architecture approach to develop and construct National and Departmental ICT Plans and Blueprints in the Government of South Africa.

• Applicability
  – to all public and private entities that engage in an Enterprise Architecture Planning programme for or on behalf of the Government of South Africa.
## EA Deliverable definition & notations

<table>
<thead>
<tr>
<th>TOGAF ADM Process</th>
<th>Deliverable Definition</th>
<th>Deliverable Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prelim</td>
<td></td>
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<tr>
<td>FW &amp; Contract</td>
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<tr>
<td>A: Architecture</td>
<td></td>
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<tr>
<td>Principles, Vision &amp; Scope</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B: Business Architecture</td>
<td></td>
<td></td>
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<tr>
<td>C: Information System Architecture</td>
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<tr>
<td>D: Technology Architecture</td>
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<td></td>
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<tr>
<td>E: Opportunities &amp; Solutions</td>
<td></td>
<td></td>
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<tr>
<td>F: Migration Planning</td>
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</tbody>
</table>

### Coherency (Line of sight)

### Consistency
TOGAF-9 Architecture Deliverables
**GWEA Framework: Deliverables**

<table>
<thead>
<tr>
<th>Preliminary (P) &amp; Vision (A) Views</th>
<th></th>
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<tbody>
<tr>
<td>EA Org Model</td>
<td>EA FW</td>
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</table>

**Purpose**

The minimum standard by which to use an Enterprise Architecture approach to develop and construct National and Departmental **ICT Plans and Blueprints**

**INTEROPERABILITY**

**CONSISTENCY**

**ALIGNMENT**

**Opportunities & Solution (E) and Implementation Plan (F) Views (Programmatic Views)**

- Consolidated Roadmap & Transition Architecture
- Implementation and Migration Plan
- Implementation Governance Model
<table>
<thead>
<tr>
<th><strong>GWEA: INFORMATION SYSTEM REFERENCE MODEL</strong></th>
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<tbody>
<tr>
<td><strong>TRANSVERSAL</strong></td>
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<tr>
<td><strong>ADMINISTRATION SYSTEMS</strong></td>
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<tr>
<td>Financial MIS</td>
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<tr>
<td>Human Resource MIS</td>
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<tr>
<td>Supply Chain MIS</td>
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<tr>
<td>e-Government (G2G, G2B) MIS</td>
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<tr>
<td>Business Intelligence / Reporting System</td>
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<tr>
<td>Geospatial Information System</td>
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<tr>
<td>Corporate Performance MIS</td>
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<tr>
<td>Supplier &amp; Contract MIS</td>
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<tr>
<td>Customer Relations MIS</td>
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<tr>
<td>Audit &amp; Risk MIS</td>
</tr>
<tr>
<td>Information &amp; ICT Service MIS</td>
</tr>
<tr>
<td><strong>COMMON SYSTEMS</strong></td>
</tr>
<tr>
<td>Project/Programme Management Software</td>
</tr>
<tr>
<td>E-Mail &amp; Collaboration Software</td>
</tr>
<tr>
<td>Events / Calendar Management Software</td>
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<tr>
<td>Office Suite (Wordpro, Spreadsheet, Presentation)</td>
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<tr>
<td>Electronic Content Management Software</td>
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<tr>
<td>Workflow Management Software</td>
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<tr>
<td>e-Learning Software</td>
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<tr>
<td><strong>DEPARTMENTAL/CLUSTER CORE</strong></td>
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<tr>
<td><strong>CORE MISSION SYSTEMS</strong></td>
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<tr>
<td>e-Government (G2C) Portals</td>
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<tr>
<td>Agriculture, Forestry, Fishery MIS</td>
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<tr>
<td>Arts &amp; Culture MIS</td>
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<tr>
<td>Communication MIS</td>
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<tr>
<td>Cooperative Governance / Provincial MIS</td>
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<tr>
<td>Correction Service MIS</td>
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<tr>
<td>Criminal/Justice MIS</td>
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<tr>
<td>Defence MIS</td>
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<tr>
<td>Economic Development MIS</td>
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<tr>
<td>Education MIS</td>
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<tr>
<td>Energy MIS</td>
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<tr>
<td>Health MIS</td>
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<tr>
<td><strong>Home Affairs &amp; Citizen MIS</strong></td>
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<tr>
<td>Human Settlement MIS</td>
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<tr>
<td>International Relations MIS</td>
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<tr>
<td>Labour / Skills Development MIS</td>
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<tr>
<td>Mineral Resource MIS</td>
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<tr>
<td>Public Works / Infrastructure MIS</td>
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<tr>
<td>Police MIS</td>
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<tr>
<td>Rural &amp; Land MIS</td>
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<tr>
<td>Science &amp; Technology MIS</td>
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<tr>
<td>Social Development / Grants MIS</td>
</tr>
<tr>
<td>Sports &amp; Recreation MIS</td>
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<tr>
<td>State Security MIS</td>
</tr>
<tr>
<td>Treasury &amp; Taxation MIS</td>
</tr>
<tr>
<td>Tourism MIS</td>
</tr>
<tr>
<td>Trade &amp; Industry MIS</td>
</tr>
<tr>
<td>Transport MIS</td>
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<tr>
<td>Water &amp; Environmental MIS</td>
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</tbody>
</table>
GWEA: Technology Reference Model

Application Delivery Infrastructure
Web Server, Portal, Application Server, & User Interface Technology

Middleware Infrastructure
Enterprise Service Bus, Message Brokering & Queuing, Business Logic, Directory & Naming, Time Service Technology

Database Management Infrastructure
Transactional DBMS, Data Warehouse, Master Data Management, & Metadata Management technology

Computing Platforms, Peripheral & Sensors
Operating Systems, Servers/Hosts, Storage, End-User Computing, Peripherals, & Data Sensing Technology

Communication Infrastructure
Transmission / Carrier (WAN, LAN), Data Switching, Internet, Intranet, Extranet, Virtual Private Network, Voice & Video Conferencing Technology

System Engineering Infrastructure
System Design/Modelling, Software development, & Software configuration technology
• South African Interoperability Framework
Interoperability in Government

“Sometimes when I consider what tremendous consequences come from little things... I am tempted to think there are no little things.”

- Bruce Barton
Interoperability – [Re-)defined

• Interoperable (Dictionary)
  – adj; able to operate in conjunction [Concise Oxford Dictionary, 9th Edition]

• Interoperability (from the Web)
  – The ability to exchange and use information. [Princeton]
  – The ability of diverse systems and organizations to work together (interoperate). [Wikipedia]
  – The ability of systems, units, or forces to provide data, information, materiel, and services to and accept the same from other systems, units, or forces, and to use the data, information, materiel, and services so exchanged to enable them to operate effectively together. [US DoD, DoDD 5000.1]
  – The capability of systems to communicate with one another and to exchange and use information including content, format, and semantics [NIST]

• Mathematician's definition
  \[
  \ln \left( \lim_{z \to \infty} \left( \left( \frac{1}{X^T} \right)^{-1} - \left( \frac{1}{X^{-1}} \right)^T \right) + \frac{1}{z} \right)^2 \right) + \sin^2(p) + \cos^2(p) = \sum_{n=0}^{\infty} \frac{\cosh(q) \sqrt{1 - \tanh^2(q)}}{2^n}
  \]
Interoperability levels*

Organisational Interoperability
- organisational components are able to perform seamlessly together.

Semantic Interoperability
- ensuring the precise meaning of exchanged information between different kind of Information Systems.

Technical Interoperability
- technical issues of linking computer systems and services.

MIOS 4.1 Document Content

• Foreword
• Executive Summary
• 1. Overview
  – Intro
  – Scope
  – Main features
  – Implementation
  – Management process
  – GWEA
  – Stakeholder involvement
  – Requirement for Next release.

• 2.1 Principles
  – Intro
  – Drivers for interoperability
  – Open Standards
  – Open Standards Organisations
  – Principles

• 2.6 Standards
  – Interconnectivity
  – Data Interoperability
  – Web Services
  – Information Access
  – Content Management
  – Identifiers
  – Mobile Phones
  – Biometric data interchange
## MIOS v4.1 Composition*

<table>
<thead>
<tr>
<th>Category</th>
<th>Component (Standards)</th>
</tr>
</thead>
</table>
| **Connectivity**                  | Web/Internet (HTTP)  
E-Mail (SMTP, MIME, IMAP, S/MIME)  
Directory & Naming (X.500 and DNS)  
Network (FTP, TCP/IP, TLS)  
Security (e.g. RC4, RSA, AES, ...)  
Web Services (SOAP, WSDL, UDDI)  
Internet Conferencing (H.323, SIP)  
Mobile Phones (WAP2, GPRS, SMS, MMS) |
| **Data Interoperability**         | Meta-Data (XML, XSL)  
Data Security (SAML)  
PKI (X.509)  
Modelling (UML, XMI)  
Ontology (OWL)  
Geospatial (GML) |
| **Information Access & Content Standards** | Web/Hypertext (HTML)  
Office Documents (UTF-8, ODF, CSV, PDF)  
Still images and Video (JPEG, PNG, TIFF, MPEG)  
File Compression (TAR, ZIP, GZIP)  
Relational DB Access (SQL-93)  
Meta-Data Content Management (Dublin Core)  
Syndication (RSS) |

• Future developments
MIOS v5 (Proposed) 1/2

• Enhance MIOS Document layout
  – Introduce a reference model (something like a TRM)
  – Add compliance guidelines for Suppliers and Acquirers

• Enhance MIOS Technology Standards
  – Review/Amend existing Standards Catalogue
MIOS v5 (Proposed) 2/2

- Introduce “citizen centric” Data Schema’s for SA:
  - Citizen/Identity data schema
  - E-Health Record data schema
  - Justice data Schema (JXML for RSA developed)
  - Education Data Schema
  - Administration (Finance, HR, SCM) data schemas
  - Performance Management data schema

- Implementation
  - Constitute National EA Governing Body.
  - Strengthen MIOS Certification capability
  - Measure conformance of ICT system against MIOS.
Conclusion

“One's mind, once stretched by a new idea, never regains its original dimensions.”
- Oliver Wendell Holmes
Conclusion

- An early start in ICT transformation and development of Interoperability and architecture frameworks advanced South Africa’s development agenda in many areas
  - The deployment of a single government network based on open standards for all national and provincial departments. The network has evolved from the open network to a New Generation Network (NGN) featuring VOIP and QoS.
  - The development of transversal applications (Basic Accounting System and now in development is Integrated Financial Management System) for use by all government departments at national and provincial level.
  - Development of Integrated systems such as Integrated Justice System (IJS) integrating justice departments through the justice value chain (policing > investigation > prosecution > judgement > incarceration to rehabilitation) based on Justice XML (JXML) schema.
  - Development of National Integrated Social Information System (NISIS) to support the war on poverty through integration of social data systems (Social Security, Education, Health, basic services, Housing, etc), profiling of poor households and referral of targeted anti-poverty services to relevant providers.
Thank You

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